Inspired by
temperature

Betriebsanleitung · Operation manual · Manual de instrucciones · Manuel d'utilisation · Manuale de d'uso · 사용 설명서 · Manual de instruções · Инструкция по эксплуатации · Kullanım talimatı · 操作说明书 ·

Minichiller® OLÉ, Unichiller® OLÉ

This documentation does not contain a device-specific technical appendix.

You can request the full operating instructions from info@huber-online.com. Please give the model designation and serial number of your temperature control unit in your e-mail.

huber

OPERATION MANUAL

Minichiller® OLÉ, Unichiller® OLÉ

Minichiller®
Unichiller®

OLÉ

This operation manual is a translation of the original operation manual.
Also for models with heater.

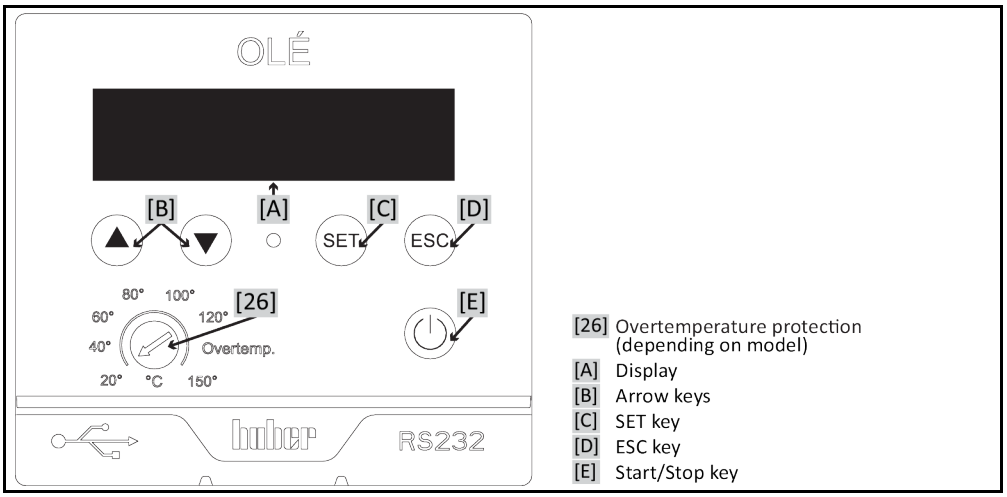
VALID FOR:

DESKTOP

Minichiller® 280 OLÉ
Minichiller® 300 OLÉ
Minichiller® 500 OLÉ
Minichiller® 600 OLÉ
Minichiller® 800 OLÉ
Minichiller® 1000 OLÉ
Minichiller® 1200 OLÉ
Unichiller® 007 OLÉ
Unichiller® 01x OLÉ
Unichiller® 02x OLÉ

Abbreviations used in model names:
Without = with air cooling, P = for applications with high pressure drop, w = water cooled, -H = heating

The control panel:
Displays and keys



[26] Overtemperature protection (depending on model)
[A] Display
[B] Arrow keys
[C] SET key
[D] ESC key
[E] Start/Stop key

Table of contents

V1.6.0en/05.04.24//1.0.0

Foreword

Dear customer,

Thank you for choosing a temperature control unit from Peter Huber Kältemaschinenbau SE. You have made a good choice. Thank you for your trust.

Please read the operation manual carefully before putting the unit into operation. Strictly follow all notes and safety instructions.

Follow the operation manual with regard to transport, start-up, operation, maintenance, repair, storage and disposal of the temperature control unit.

We fully warrant the temperature control unit for the specified intended operation.

The models listed on page 5 are referred to in this operation manual as temperature control units and Peter Huber Kältemaschinenbau AG as Huber company or Huber.

1 Introduction

1.1 Identification / symbols in the operation manual

The following identifications and symbols are used in the texts and illustrations.

Overview

Identification / symbol	Description
→	Reference to information / procedure.
»TEXT«	Reference to a chapter in the operation manual. In the digital version, the text is clickable.
>TEXT< [NUMBER]	Reference to the wiring diagram in the annex. The designation and the search digit are specified.
>TEXT< [LETTER]	Reference to a drawing in the same paragraph. The designation and the search digit are specified.
▪	List, first level
–	List, second level

1.2 Information on the EU Declaration of Conformity

CE The equipment complies with the basic health and safety requirements of the European Directives listed below:

- Machinery Directive
- Low Voltage Directive
- EMC Directive

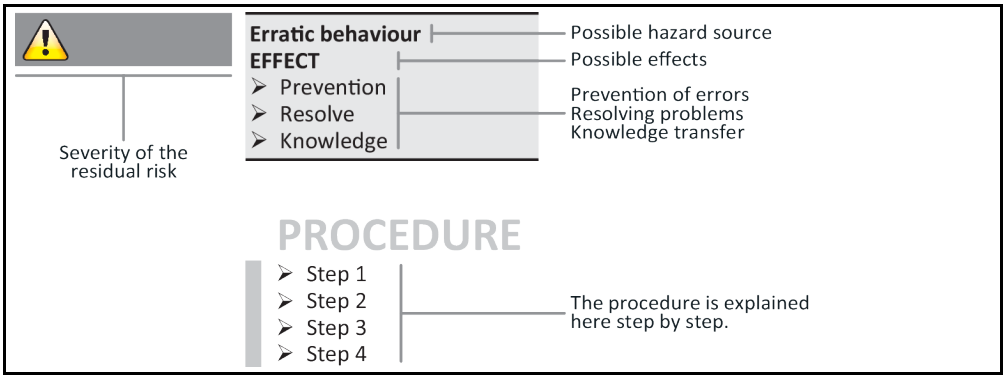
1.3 Safety

1.3.1 Symbols used for Safety Instructions

Safety instructions are marked by the below combinations of pictograms and signal words. The signal word describes the classification of the residual risk when disregarding the operation manual.

DANGER	**Denotes an immediate hazardous situation that will result in death or serious injuries.**
WARNING	**Denotes a general hazardous situation that may result in death or serious injuries.**
CAUTION	**Denotes a hazardous situation that can result in injury.**
NOTE	**Denotes a situation that can result in property material damage.**
INFORMATION	Denotes important notes and usable hints.

Safety information and procedure



The safety information in this operation manual is designed to protect the operating company, the operator and the equipment from damage. First inform yourself about any residual risks due to misuse before you start an operation.

1.3.2 Representation of symbols on the temperature control unit

The following pictograms are used as safety identifiers. The table gives an overview of the safety identifiers used here.

Overview

Identifier	Description
Mandatory sign	
	- Observe the instructions
Warning sign	
	- General warning sign - Observe the instructions
	- Warning of electrical voltage
	- Warning of hot surface
	- Warning of flammable substances
Miscellaneous	
	Follow the national and local instructions for the disposal of electrical appliances. → Page 63, section **»Disposal«**

1.3.3 Proper operation

DANGER

Operating the temperature control unit in a potentially explosive area

DEATH THROUGH EXPLOSION

➢ Do NOT install or start up the temperature control unit within an ATEX zone.

WARNING

Improper use

SERIOUS INJURY AND PROPERTY DAMAGE

- Store the operation manual where it is easy to access in close proximity to the temperature control unit.
- Only adequately qualified operators may work with the temperature control unit.
- Operators must be trained before handling the temperature control unit.
- Check that the operators have read and understood the operation manual.
- Define precise responsibilities of the operators.
- Personal protective equipment must be provided to the operators.
- Be sure to follow the responsible body's safety rules to protect life and limb and to limit damages!

NOTE

Modifications to the temperature control unit by third-parties

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Do not allow third parties to make technical modifications to the temperature control unit.
- The EU declaration of conformity becomes invalid if any modifications are made to the temperature control unit without the approval of Huber.
- Only specialists trained by Huber may carry out modifications, repairs or maintenance work.
- **The following must be observed without fail:**
- Only use the temperature control unit in a fault-free condition!
- Have the start-up and repairs carried out by specialists only!
- Do not ignore, bypass, dismantle or disconnect any safety devices!

The temperature control unit must not be used for any purposes other than temperature control in accordance with the operation manual.

The temperature control unit is made for industrial use. The temperature control unit is used to maintain the temperature of applications, such as glass or metal reactors or other expedient items in laboratories and industry. Flow-through coolers and calibration baths must be used only in combination with Huber temperature control units. Only use thermal fluids suitable for the overall system. The cooling or heating capacity is provided at the pump connections or - where present - in the tempering bath. For the technical specification, refer to the datasheet. → From page 65, Section **»Annex«**. Install, set up and operate the temperature control unit according to the instructions in this operation manual. Any failure to comply with the operation manual is considered as improper operation. The temperature control unit was manufactured according to the state of the art and the recognized safety rules and regulations. Safety devices are installed in your temperature control unit.

1.3.4 Reasonably foreseeable misuse

Use with medical devices (e.g. in Vitro diagnostic procedure) or for direct foodstuff temperature control is **NOT** permissible.

The temperature control unit must **NOT** be used for any purposes other than temperature control in accordance with the operation manual.

The manufacturer accepts **NO** liability for damage caused by **technical modifications** to the temperature control unit, **improper handling** or use of the temperature control unit if the operation manual is **not observed**.

1.4 Responsible bodies and operators – Obligations and requirements

1.4.1 Obligations of the responsible body

The operation manual is to be stored where it is easy to access in close proximity to the temperature control unit. Only adequately qualified operators (e.g. chemists, CTA, physicists etc.) are permitted to work with the temperature control unit. Operators must be trained before handling the temperature control unit. Check that the operators have read and understood the operation manual. Define precise responsibilities of the operators. Personal protective equipment must be provided to the operators.

- The responsible body must install a condensation water / thermal fluid drip tray below the temperature control unit.
- The use of a drip tray may be prescribed by national legislation for the installation area of the temperature control unit (incl. accessory). The responsible body must check and apply the national regulations applicable for it accordingly.
- The temperature control unit complies with all applicable safety standards.
- Your system, which uses our temperature control unit, must be equally safe.
- The responsible body must design the system to ensure it is safe.
- Huber is not responsible for the safety of your system. The responsible body is responsible for the safety of the system.
- Although the temperature control unit provided by Huber meets all the applicable safety standards, integration into a system may give rise to hazards that are characteristic of the other system's design and beyond the control of Huber.
- It is the responsibility of the system integrator to ensure that the overall system, into which this temperature control unit is integrated, is safe.
- The **>Mains isolator<** [36] (if present) can be locked in the off position to facilitate safe system installation and maintenance of the temperature control unit. It is the responsibility of the responsible body to develop any lock-out/tag-out procedure for the energy source in accordance with local regulations (e.g. CFR 1910.147 for the US).

1.4.1.1 Proper disposal of resources and consumables

Do comply with all national disposal regulations applicable for you. Contact your local waste management company for any questions concerning disposal.

Overview

Material / Aids	Disposal / Cleaning
Packaging material	Keep the packaging material for future use (e.g. transport).
Thermal fluid	Please refer to the safety data sheet of the thermal fluid used for information on its proper disposal. Use the original thermal fluid container when disposing it.
Filling accessories, e.g. beaker	Clean the filling accessories for reuse. Make sure that the materials and cleaning agents used are properly disposed of.
Aids such as towels, cleaning cloths	Tools used to take up spilled thermal fluid must be disposed of in the same fashion as the thermal fluid itself. Tools used for cleaning must be disposed of depending on the cleaning agent used.
Cleaning agents such as stainless steel cleaning agents, sensitive-fabrics detergents	Please refer to the safety data sheet of the cleaning agent used for information on its proper disposal. Use the original containers when disposing of large quantities of cleaning agents.
Consumables such as air filter mats, temperature control hoses	Please refer to the safety data sheet of the consumables used for information on their proper disposal.

1.4.1.2 Temperature control units with refrigerants

1.4.1.2.1 General information

In the following sections we would like to inform you about the refrigerants used. The sections serve to acquaint you as the operating company with some of the necessary responsibilities.

All Huber temperature control units are designed for easy installation at the place of installation.

NO gas detection sensor is installed in this temperature control unit!

Huber offers suitable gas detection sensors and analysis units that can be installed in the building.

The company operating the system is responsible for: The correct installation of the temperature control unit in accordance with the respective national laws and local regulations.

1.4.1.2.1.1 Temperature control unit with natural refrigerants

Temperature control unit with natural refrigerants (NR)

Since 1980, Huber temperature control units with natural refrigerants work with repeatedly proven, safe and highly-sustainable technologies. The temperature control unit has been constructed to the requirements of EU and EFTA countries. The relevant standards and regulations for temperature control units with natural refrigerants contain a number of stipulations, the importance of complying with which is set out below.

Temperature control units with water cooling can be connected to a building's exhaust air system. Temperature control units with air cooling discharge the exhaust air directly from the temperature control unit to the place of installation.

Huber offers suitable gas detection sensors and analysis units that can be installed in the temperature control unit or in the building.

- The cooling circuit is permanently technically tight.
- The temperature control unit is a permanently closed individual compact unit (i.e. a functional unit inside a housing).
- The quantity of the refrigerant is minimized (in "systems with limited filling capacity"). The filling capacity of the refrigerant is specified on the data sheet and on the rating plate.
- The refrigerant circuit must be maintained during the service life of the temperature control unit.

1.4.1.2.2 Obligations of the responsible body

WARNING

Exceedance of the refrigerant limit value per m³ ambient air

DEATH OR SERIOUS INJURY DUE TO EXPLOSION OR SUFFOCATION

- ➢ Observe the amount of refrigerant contained (see data sheet/rating plate of the temperature control unit) and the room size when installing the temperature control unit.
- ➢ National laws and local regulations can demand additional safety measures for the place of installation.
- ➢ The temperature control unit is not approved for operation **in an ATEX zone**.

1.4.1.2.2.1 Example of the place of installation

This section is valid for: Temperature control units with refrigerants

The following enumeration only provides an incomplete overview of possible requirements.

Among others, the following must be observed at the planned place of installation of the temperature control unit with refrigerant:

- Limitation of the refrigerant filling capacity in relation to the room size.
- Installation inside a machinery room.
- Monitoring by means of a gas detection sensor.
- Conditions for outdoor installation.
- All poles are switched off in the event of a fault.

The respective national laws and local regulations must be observed.

1.4.1.2.2.2 Connection >Exhaust air< [105] on the temperature control unit

This section is valid for: Temperature control unit with natural refrigerants (except CO_2 and tabletop units)

The temperature control unit is prepared to enable connection to a building's exhaust air system. To this end, the cover at the **>Exhaust air<** [105] connection must be removed.

Connection of the building's exhaust air system (if necessary):

The building's exhaust air system is connected to the temperature control unit by means of the **>Exhaust air<** [105] connection (DN 100). For the exact position please refer to the wiring diagram. → Section **»Annex«** in the operation manual of the temperature control unit.

PROCEDURE

- ➢ Remove the cover at the **>Exhaust air<** [105] connection. This cover must only be removed when the building's exhaust air system is used!
- ➢ Connect the **>Exhaust air<** [105] connection on the temperature control unit with the building's exhaust air system.

1.4.1.2.2.3 Temperature control units with optional gas detection sensor

This section is valid for: Temperature control unit with natural refrigerants (except CO_2 and tabletop units)

A mounting plate onto which the optionally available gas detection sensor can be mounted is integrated in the temperature control unit. The operating company must: Install this gas detection sensor, establish its external electrical connection and check its function.

INFORMATION For more detailed information, please refer to the Huber installation guide and the manufacturer's documentation for the gas detection sensor.

Function:

- The cable entry for the gas detection sensor connection is marked in the wiring diagram.
- The gas detection sensor enables a safety shutdown at 20% of the lower explosive limit. The operating company must install a power disconnect for this purpose.
- Further information on the gas detection sensor:
  - A **24 V DC** external power supply must be available for the gas detection sensor. The alarm output of the gas detection sensor uses a 4 - 20 mA signal. Please refer to the data sheet of the gas detection sensor for the technical information necessary for installation and operation. The operating company is responsible for this and for the other measures.
  - The operating company is responsible for the **calibration of the gas detection sensor** prior to initial operation and the observance of calibration and maintenance intervals according to the manufacturer's operation manual. We recommend to set calibration and maintenance intervals between 6 and 12 months if no information is provided. For increased safety requirements, shorter intervals can be specified. On request we will recommend a specialist company to carry out the calibration and maintenance.

Processing unit for gas detection sensor:

On request, a **separate processing unit is available as an accessory** for the control of the power disconnect relay. The processing unit provides a potential-free switching contact and simultaneously provides the power supply and analysis of the gas detection sensor. Both variants require the operating company to provide the necessary dimensioning and installation. The alarm of the gas detection system can be connected to the operating company's alarm control unit. The operating company is responsible for this and for the other measures.

1.4.1.3 Temperature control units with fluorinated greenhouse gases/refrigerants

F gases regulation (EC) No. 517/2014 of April 16, 2014, on fluorinated greenhouse gases, and repealing Regulation (EC) No. 842/2006.

These regulations deal with all systems that contain fluorinated refrigerants. The substances dealt with in Directive (EC) No. 1005/2009 of the European Parliament and of the Council of 16 September 2009 that deplete the ozone layer are excluded (CFC/HCFC).

The directive regulates the reduction of the emission, utilization, recovery, and destruction of certain fluorinated greenhouse gases. It also regulates the identification and disposal of products and devices that contain these gases. Since July 4, 2007, responsible bodies must check their stationary refrigeration systems for leaks at regular intervals, and have any leaks eliminated immediately.

Directive (EC) No. 303/2008 contains stipulations on the training and certification of companies and personnel that are permitted to execute the specified activities.

Obligations of the responsible bodies:

- Directive (EC) No. 842/2006 already imposed a number of obligations upon responsible bodies regarding certain fluorinated greenhouse gases. The new Ordinance on Fluorinated Greenhouse Gases upholds these to a large extent. Some duties are added while others are designed differently by this new ordinance. Please refer to the text of this ordinance for a complete overview of the individual responsibilities of responsible bodies.
- General obligation to reduce emissions.
- Only certified companies may maintain, repair or decommission refrigeration systems. The responsible bodies must verify that these companies are certified.
- Regular leak tests of stationary refrigeration systems by certified personnel (such as Huber service engineers). The required test interval is based on the refrigerant filling capacity and the type of refrigerant, converted to $CO_2$2 equivalent.
- Responsibility of responsible bodies operating a plant to recover F-gases by certified personnel.
- Obligatory documentation requirement in the refrigeration system’s operation manual, specifying type and volume of refrigerant used or recovered. The responsible body must keep the records for at least 5 years after their creation and present it to the responsible authority upon request.
- Temperature control units with natural refrigerants (NR) are exempt from this Directive.
- Please refer to the data sheet or rating plate of your temperature control unit for the quantity and type of refrigerant.
- Additional information about the definition of the inspection interval can be found on our website.

1.4.2 Requirements for operators

Work on the temperature control unit is reserved for appropriately qualified specialists, who have been assigned and trained by the responsible body to do so. Operators must be at least 18 years old. Under 18-year olds may operate the temperature control unit only under the supervision of a qualified specialist. The operator is responsible vis-a-vis third-parties in the work area.

1.4.3 Obligations of the operators

Carefully read the operation manual before operating the temperature control unit. Please observe the safety instructions. When operating the temperature control unit, wear appropriate personal protective equipment (e.g. safety goggles, protective gloves, non-slip shoes).

1.5 General information

1.5.1 Description of workstation

The workstation is located at the control panel in front of the temperature control unit. The workstation is determined by the customer's connected peripheries. Accordingly, it must be designed safe by the responsible body. The workstation design also depends on the applicable requirements of the German occupational health and safety regulations [BetrSichV] and the risk analysis for the workstation.

1.5.2 Safety devices to DIN 12876

The rating of your temperature control unit is stated on the data sheet in the appendix.

Rating of laboratory thermostats and laboratory baths

Classification	Temperature control medium	Technical requirements	Identification [d]
I	Non-combustible [a]	Overheat protection [c]	NFL
II	Combustible [b]	Adjustable overheat protection	FL
III	Combustible [b]	Adjustable overtemperature protection and additional low-level protection	FL

[a] Usually water; other fluids only if non-combustible even within the temperature range of an individual fault.

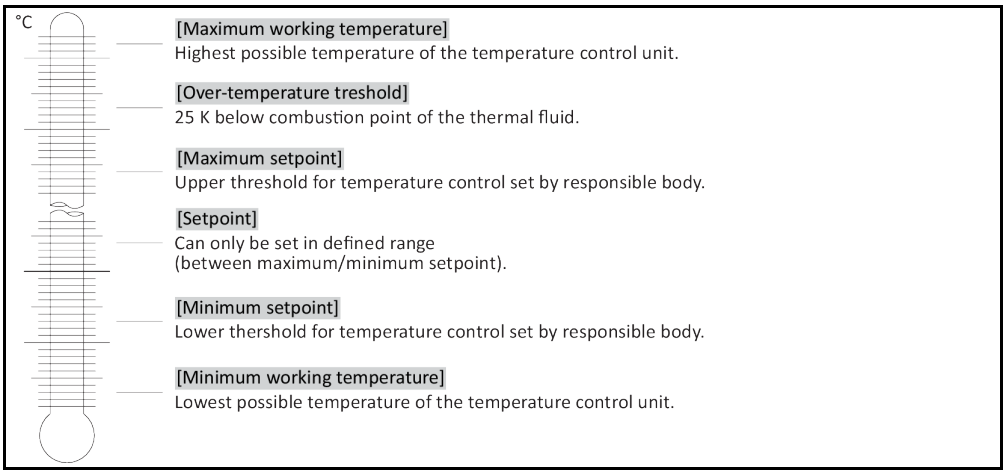
[b] The temperature control media must have a fire point of ≥ 65 °C.

[c] The overheat protection can, for instance, be realized using a suitable fill level sensor or a suitable temperature limiter.

[d] Optional at the choice of the manufacturer.

- Temperature control units with heating correspond to class number III/FL. These temperature control units are characterized by an “H” in the device name.
- Temperature control units without heating correspond to class number I/NFL.

Overview of the temperature thresholds



1.5.2.1 Mechanical overtemperature protection

Only temperature control units with a heater are fitted with a mechanical overtemperature protection. → Page 40, section **»Setting the overtemperature (OT) protection«**.

1.5.2.2 Low level protection

Minichiller with heater: A mechanical float is used for level monitoring. A floating body, which is guided in a device, floats on the surface of the thermal fluid. Depending on the level of the thermal fluid, the float device signals the electronics a **state of good** (in case of sufficient filling) or a **state of bad** (in case of insufficient filling).The functionality of the float is checked at regular intervals during continuous operation.

Unichiller with heater: The low level protection operates via a pressure sensor in the thermal fluid circuit. The pump and the thermal fluid provide the required pressure at the pressure sensor. Air in the system (fill level too low, inadequately vented) prevents the pressure from reaching the value specified at the pressure sensor. Temperature control and circulation are interrupted.

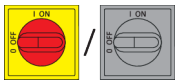
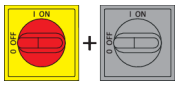
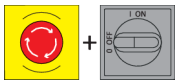
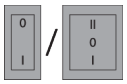
1.5.3 Further protective devices

INFORMATION

Emergency strategy – interrupt the power grid connection!

To determine the type of switch used or the switch combination installed, please refer to the connection sketch. → From page 65, section **»Annex«**.

Overview of switch types

Switch	Designation	Interrupting the power grid connection
	**>Mains isolator<** [36] (red-yellow) or **>Mains isolator<** [36] (grey)	Turn the **>Mains isolator<** [36] to the “0” position.
	**>Mains isolator<** [36] (red-yellow) and additional **>Appliance switch<** [37] (gray):	Turn the **>Mains isolator<** [36] to the “0” position, then the **>Appliance switch<** [37] to the “0” position.
	**>Emergency stop switch<** [70] (red-yellow) and **>Mains isolator<** [36] (gray):	Press the **>Emergency stop switch<** [70], then set the **>Mains isolator<** [36] to the “0” position.
	**>Power switch<** [37]	**Power connection via socket:** Pull the plug, then set the **>Power switch<** [37] to the “0” position. **Connection via hard wiring:** Use the building’s circuit breaker, then set the **>Power switch<** [37] to the “0” position.
–	Without a switch or inside a protective housing	**Power connection via socket:** Pull the plug. **Power connection via hard wiring:** Use the building’s circuit breaker.

1.5.3.1 Power interruption

Following a power outage (or when switching on the temperature control unit), this function can be used to determine how the temperature control unit is supposed to respond.

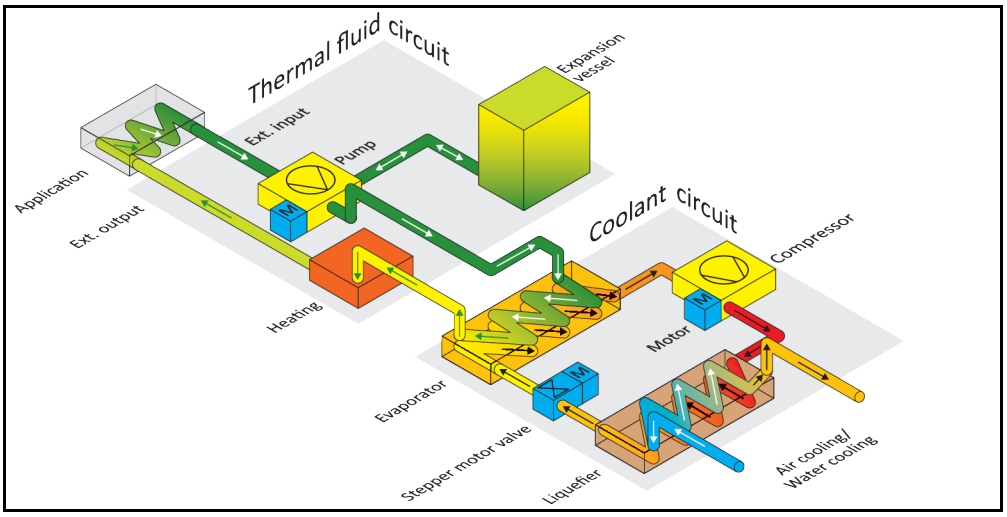
Auto start function switched off
The temperature control is started only by manual input when the temperature control unit is turned on.

Auto start function switched on
The temperature control unit is set to the same state it was in before the power outage. For example, before the power outage: Temperature control is off; after power outage: Temperature control is off. If temperature control was active during a power outage, the process will automatically continue after the power outage.

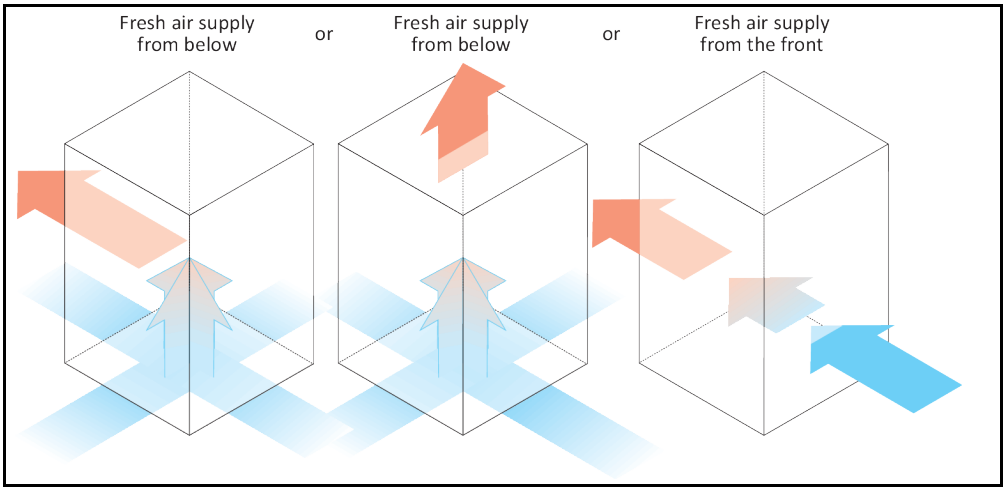
→ Page 39, section **»Changing the Auto-Start function«**.

1.6 Exemplary illustrations of the cooling variants

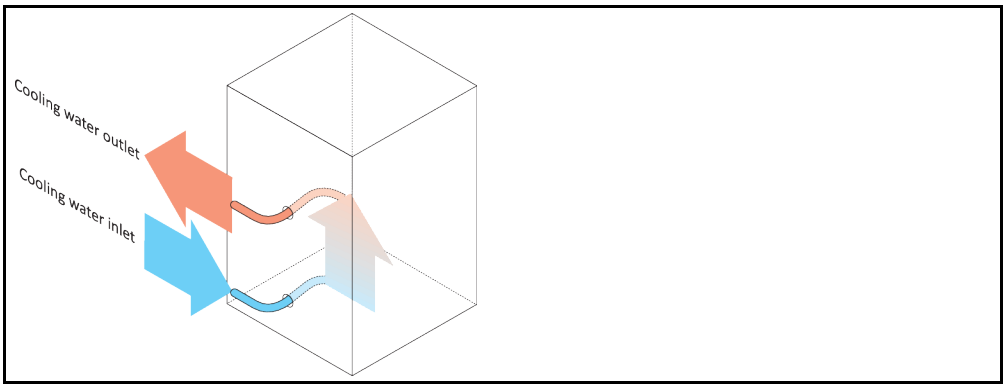
Example: Air and water cooling



Air cooling: Air inlet



Water cooling: Water connection



1.6.1 Consequence of inadequate energy dissipation

Room air/cooling water
Consequences of, for instance, contamination of the liquefier fins, inadequate clearance between temperature control unit to wall/bath wall, room air/cooling water too warm, cooling water differential pressure too low, suction strainer contamination: The refrigerant in the coolant circuit can no longer fully discharge the admitted energy to the room air/cooling water. Thus there is not sufficient liquefied refrigerant available, the condensation temperature and the energy consumption to rise.

Coolant circuit
Consequences of inadequate refrigerant quantity/rising condensation temperature: Not all the cooling capacity from the coolant circuit is available at the evaporator. This means reduced energy transmission from the thermal fluid circuit.

Thermal fluid circuit
Consequence of inadequate energy dissipation from the thermal fluid: The thermal fluid can only dissipate the energy from your application to a limited extent.

Application
Consequences of inadequate energy dissipation from the application: The energy created (exothermic) in the application can no longer be fully dissipated.

Temperature control unit
An electronically-controlled expansion valve is used in the temperature control unit to optimize the power adjustment. The expansion valve always provisions the maximum possible cooling capacity within the permissible ambient temperature range. The temperature control unit switches off when the upper range is reached (maximum permissible ambient temperature).

2 Commissioning

2.1 In-plant transport

WARNING

Temperature control unit is not transported / moved according to the specifications in this operation manual

DEATH OR SERIOUS INJURY DUE TO CRUSHING

- Always transport / move the temperature control unit according to the specifications in this operation manual.
- Wear personal protective equipment during transport.
- Always work with the specified number of persons when moving the temperature control unit on casters (if any).
- If the temperature control unit is equipped with casters and parking brakes: 2 parking brakes are always freely accessible when moving the temperature control unit. Activate the **2 parking brakes** in an emergency! If only **one** parking brake is activated on the casters in an emergency: The temperature control unit is not stopped but rotates around the axis of the caster with the activated parking brake!

NOTE

Temperature control unit transported in a horizontal position

DAMAGE TO THE COMPRESSOR

- Only transport the temperature control unit in an upright position.

NOTE

Filled temperature control unit is transported

MATERIAL DAMAGE DUE TO OVERFLOWING THERMAL FLUID

- Only transport an emptied temperature control unit.

- If available, use the eyes on the top side of the temperature control unit for transportation.
- Use an industrial truck for transport.
- The casters on the temperature control unit are not suitable for transport. The casters are symmetrically loaded with 25% of the total mass of the temperature control unit.
- Remove the packing material (e.g. the palette) only at the place of installation.
- Protect the temperature control unit from transport damage.
- Do not transport the temperature control unit alone and without aids.
- Check the load bearing capacity of the transportation route and the place of installation.
- The parking brakes at the casters (if present) must be activated and/or the leveling feet (if present) must be unscrewed/activated before the temperature control unit is put into operation. → Page 29, section **»Unscrewing/activating the leveling feet (if any)«**.

2.1.1 Lifting and transporting the temperature control unit

2.1.1.1 Temperature control unit without lifting eyes

- Do not lift and transport the temperature control unit alone and without aids.
- Lift and transport the temperature control unit only with an industrial truck.
- The industrial truck must have a lifting force equal to or greater than the weight of the temperature control unit. See the data sheet for the weight of the temperature control unit. → From page 65, section **»Annex«**.

2.1.2 Positioning the temperature control unit

2.1.2.1 Temperature control unit with casters

- Do **not** use the casters for the transportation to the place of installation. → Page 22, section **»Lifting and transporting the temperature control unit«**.
- Use the casters only for positioning at the place of installation.
- Only ever move the temperature control unit on the casters if the surface is level, without gradient, non-slip and stable.
- Do not move the temperature control unit alone.

- **At least 2 persons** are required to move the temperature control unit on casters. **At least 5 persons** are required to move the temperature control unit on the casters if the total weight of the temperature control unit is **over 1.5 tons**.
- The parking brakes must be activated at the casters and/or the feet (if present) must be unscrewed/activated before the temperature control unit is put into operation. → Page 29, section **»Unscrewing/activating the leveling feet (if any)«**.

2.1.2.2 Temperature control unit without casters

- An industrial truck must be used for positioning the temperature control unit.
- Do not move the temperature control unit alone.
- **At least 2 persons** are required to move the temperature control unit.
- The industrial truck must have a lifting force equal to or greater than the weight of the temperature control unit. See the data sheet for the weight of the temperature control unit. → From page 65, section **»Annex«**.
- The leveling feet (if present) must be unscrewed/activated before the temperature control unit is put into operation. → Page 29, section **»Unscrewing/activating the leveling feet (if any)«**.

2.2 Unpacking

WARNING

Starting up a damaged temperature control unit

DANGER TO LIFE FROM ELECTRIC SHOCK

➢ Do not operate a damaged temperature control unit.
➢ Please contact Customer Support. → Page 63, section **»Contact data«**.

PROCEDURE

➢ Check for damage to the packaging. Damage can indicate material damage to the temperature control unit.
➢ Check for any transport damage when unpacking the temperature control unit.
➢ Always contact your forwarding agent regarding the settlement of claims.
➢ Observe the proper disposal of packaging material. → Page 15, section **»Proper disposal of resources and consumables«**.

2.3 Ambient conditions

CAUTION

Unsuitable ambient conditions / unsuitable installation

SERIOUS INJURY DUE TO CRUSHING

➢ Comply with all requirements! → Page 23, section **»Ambient conditions«** and → Page 25, section **»Installation conditions«**.

INFORMATION

Make sure there is adequate fresh air available at the site for the circulation pump and the compressors. The warm exhaust air must be able to escape upwards unhindered.

Free-standing models
For the connection data, see the data sheet. → From page 65, section **»Annex«**.

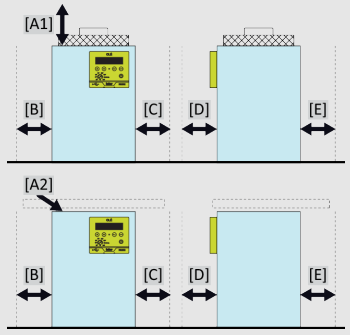
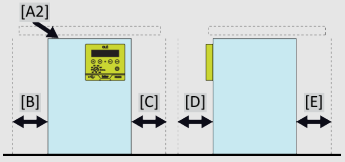
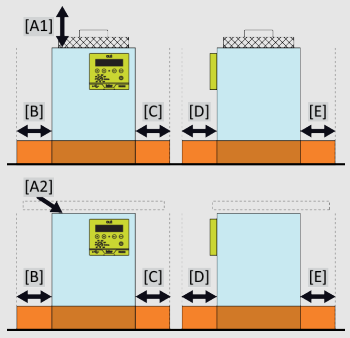
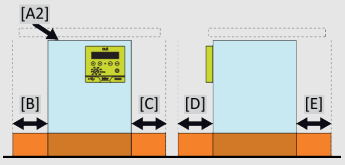
Use of the temperature control unit is permitted only under normal ambient conditions in accordance with the currently valid DIN EN 61010-1.

- Use only indoors. The illuminance must be at least 300 lx.
- Installation altitude up to 2,000 meters above sea level.
- Maintain wall and ceiling clearance for adequate air exchange (dissipation of waste heat, supply of fresh air for the temperature control unit and work area). Ensure adequate floor clearance for air-cooled temperature control units. Do not operate this temperature control unit from within the box or with an inadequately dimensioned bath. This inhibits the air exchange.
- Ambient temperature values are provided on the technical data sheet; to ensure trouble-free operation, compliance with the ambient conditions is mandatory.

- Relative humidity max 80% to 32 °C and 40 °C decreasing linearly to 50%.
- Short distance to supply connections.
- The temperature control unit must not be installed so as to hinder or even prevent access to the disconnecting device (to the power supply).
- For the magnitude of the mains voltage fluctuations, refer to the datasheet. → From page 65, section **»Annex«**.
- Transient surges, as would normally occur in the power supply system.
- Installation Class 3
- Applicable degree of soiling: 2.
- Surge category II.

Please note: → Page 20, section **»Exemplary illustrations of the cooling variants«**.

Wall clearances

Side	Distance in cm	
	Air cooling	Water cooling
		
[A1] Top	Air outlet on top of unit: free standing	–
[A2] Top	undermounting possible	undermounting possible
[B] Left	min. 20	min. 10
[C] Right	min. 20	min. 10
[D] Front	min. 20	min. 10
[E] Rear	min. 20	min. 20
Side	**Distance in cm (for operation in a tub)**	
	Air cooling	Water cooling
		
[A1] Top	Air outlet on top of unit: free standing	–
[A2] Top	undermounting possible	undermounting possible
[B] Left	min. 20	min. 20
[C] Right	min. 20	min. 20
[D] Front	min. 20	min. 20
[E] Rear	min. 20	min. 20

2.3.1 EMC-specific notes

INFORMATION

Connecting cables in general
Prerequisites for a failure-free operation of the temperature control units incl. their connections with external applications: Installation and wiring must be carried out professionally. Related topics: "Electrical safety" and "EMC-compliant wiring".

Cable lengths
For flexible/fixed cable routing of more than 3 meters, the following must amongst other things be observed:
- Equipotential bonding, grounding (see also technical data sheet "Electromagnetic compatibility EMC")
- Compliance with "external" and/or "internal" lightning/overvoltage protection.
- Design protection measures, professional cable selection (UV resistance, steel pipe protection, etc.)

Attention:
The operating company is responsible for compliance with national/international directives and laws. This also includes the testing of the installation/wiring required by law or standards.

This device is suitable for operation in **"industrial electromagnetic environments"**. It meets the **"immunity requirements"** of the currently applicable **EN61326-1**, which are required for this environment.

It also meets the **"interference emission requirements"** for this environment. It is a **Group 1** and **Class A** device according to the currently applicable **EN55011**.

When operating the temperature control unit in another environment, its electromagnetic compatibility can in rare cases not be ensured.

Group 1 specifies that high frequency (HF) is only used for the function of the device. **Class A** defines the interference emission limits to be observed.

2.4 Installation conditions

WARNING

Temperature control unit is connected to the power supply line
DEATH FROM ELECTRICAL SHOCK BY DAMAGE TO THE POWER CABLE.
➢ Do not put temperature control unit on power cable.

CAUTION

Operating the temperature control unit fitted with casters without brakes activated
CRUSHING OF LIMBS
➢ Activate brakes on the casters.

- Allow the temperature control unit to acclimate for about 2 hours when changing from a cold to a warm environment (or vice versa). Do not turn on the temperature control unit before!
- Install upright, stable and tilt-resistant.
- Use a non-combustible, sealed foundation.
- Keep the environment clean: Prevent slip and trip hazards.
- Wheels, if installed, must be locked after installation!
- Spilled/leaked thermal fluid must be removed immediately. Observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.
- Observe the floor load bearing capacity for large units.
- Observe the ambient conditions.

2.5 Recommended temperature control and cooling water hoses

CAUTION

Use of unsuitable/defective hoses and/or hose connections

INJURIES

- **Thermal fluid**
- Pay attention to the permissible pressure and temperature range when selecting temperature control hoses.
- Use appropriate hoses and/or hose connections.
- Check periodically for leaks and the quality of the hoses and hose connections and take suitable measures (replace) as required.
- Isolate and protect temperature control hoses against contact/mechanical load.
- **Cooling water**
- Reinforced hoses must be used to satisfy tougher safety requirements.
- Shut off the cooling water supply to the temperature control unit even for shorter downtimes (e.g. overnight).

CAUTION

Hot or cold thermal fluid and surfaces

BURNS TO LIMBS

- Avoid direct contact with the thermal fluids or the surfaces.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).

CAUTION

Uncontrolled formation of ice at the connections and hoses of the thermal fluid circuit

SLIP AND TRIP HAZARD

- If the temperature is controlled in the minus range, ice forms at the hoses and connections of the thermal fluid circuit. This occurs by condensing and freezing of atmospheric humidity.
- Check the strength of the ice formation. If too much ice is formed, this increases the risk of the temperature control unit tipping over. Secure the temperature control unit against tipping if this is the case.
- Check the ground below the ice formation for condensation water. Collect the condensation water with a suitable container or thoroughly remove it at regular intervals. You thus prevent the danger of slipping caused by condensation.

To connect applications, use only temperature control hoses that are compatible with the thermal fluid used.

- We recommend you use only temperature-insulated temperature control hoses with your temperature control unit. The responsible body is responsible for the insulation of connection valves.
- We **exclusively** recommend reinforced hoses for connecting to the cooling water supply. Cooling water and insulated temperature control hoses can be found in the Huber catalogue under Accessories.

2.6 Wrench sizes and torques

Observe the proper wrench sizes for the pump connection at the temperature control unit. The following table lists the pump connections and the resulting wrench sizes, as well as the torque values. Always perform a leak test afterwards and re-tighten the connections if required. The values of the maximum torques (see table) must **not** be exceeded. Protect the pump connections against undue twisting by counterholding.

Overview wrench sizes and torques

Connection	Sleeve nut wrench size	Connector wrench size	Recommended torques in Nm	Maximum torques in Nm
M16x1	19	17	30	35
M24x1.5	27	27	47	56
M30x1.5	36	32	79	93
	36	36	79	93
M38x1.5	46	41/46	130	153

Connection	Sleeve nut wrench size	Connector wrench size	Recommended torques in Nm	Maximum torques in Nm
M45x1.5	50	50	200	210
G-thread (flat-sealing)	Adapt the torque to the material of the flat seal used. First hand-tighten the temperature control hose. When using adapter pieces, do not overtighten the G-thread on the pump connection when connecting a temperature control hose. When connecting a temperature control hose to the adapter piece, secure the G-thread against overtightening.			

2.7 Temperature control units with water cooling

WARNING

Open electrical wires below the temperature control unit if the temperature falls below the dew point.

DEATH FROM ELECTRICAL SHOCK BY WATER ENTRY INTO THE ELECTRIC LINES.

- A temperature below the dew point may result in condensation in the temperature control unit and at the cooling water connections. The condensation is caused by high humidity at the cooling water-bearing components. The condensation exists the temperature control unit at the bottom.
- Electrical lines directly below the temperature control unit must be protected against liquid ingress.

CAUTION

Use of unsuitable/defective hoses and/or hose connections

INJURIES

- **Thermal fluid**
- Pay attention to the permissible pressure and temperature range when selecting temperature control hoses.
- Use appropriate hoses and/or hose connections.
- Check periodically for leaks and the quality of the hoses and hose connections and take suitable measures (replace) as required.
- Isolate and protect temperature control hoses against contact/mechanical load.
- **Cooling water**
- Reinforced hoses must be used to satisfy tougher safety requirements.
- Shut off the cooling water supply to the temperature control unit even for shorter downtimes (e.g. overnight).

NOTE

No protection against corrosion

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- The addition of anti-corrosion agents is mandatory if salts (chlorides, bromide) have been added to the water circuit.
- Ensure that the materials used in the cooling water circuit are resistant with respect to the cooling water. For information on materials used see the data sheet. → From page 65, section **»Annex«**.
- Take suitable measures to maintain the warranty conditions.
- For information about water quality, see www.huber-online.com.

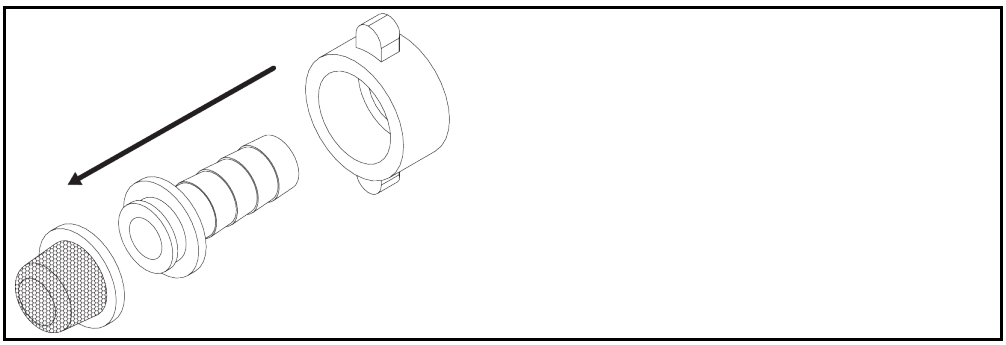
NOTE

Usage of un-filtered river/sea or ocean water as cooling water

DAMAGE TO THE TEMPERATURE CONTROL UNIT

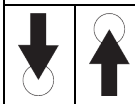
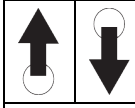
- Un-filtered river or sea water is not suitable for use as cooling water due to its contaminants.
- Use drinking water or filtered river or sea water for cooling.
- Sea water must not be used for water cooling.
- For information about water quality, see www.huber-online.com.

Installing a suction strainer (table-top models only)



The following icons can be found near the cooling water connection on the temperature control unit. The table gives an overview of the icons used.

Overview

Icon	Description
	Cooling water connection
	Cooling water inlet
	Cooling water outlet
	Cooling water drain

Preparing the temperature control unit with water cooling:

INFORMATION

To minimize cooling water consumption, Huber temperature control units with water cooling are equipped with a cooling water regulator. It limits the flow of cooling water to the amount required by the current load situation of the temperature control unit. If only a low cooling capacity is requested, only a small amount of cooling water is consumed. It cannot be ruled out that cooling water flows when the machine is switched off. Shut off the cooling water supply to the temperature control unit even for shorter downtimes (e.g. overnight).

Use of drinking water for water cooling purposes: A backflow from the cooling water line into the drinking water supply must be prevented on the building side. The responsible body must check and apply the national regulations applicable for it accordingly.

In the event of outdoor installation, the responsible body must ensure that the cooling water supply and return lines are laid frost-protected. The cooling water temperature must not fall below 3 °C. At ambient temperatures below 3 °C, the cooling water supply must be heated.

The minimum pressure differential in the cooling water circuit and the recommended cooling water inlet temperature can be found on the data sheet. → From page 65, section **»Annex«**.

Observe the wiring diagram. → From page 65, section **»Annex«**.

PROCEDURE

- Close (if present) the **>Cooling water drain<** [15].
- Connect the **>Cooling water outlet<** [14] to the water return flow. A seal must be used for this.
- Insert the suction strainer (dirt trap) into the **>Cooling water inlet<** [13].
- Connect the **>Cooling water inlet<** [13] to the water supply.

NOTE

Leaking cooling water connections

DAMAGE BY FLOODING OF ROOMS

- Slowly open the building-side isolating valves of the cooling water supply and return line.
- If water leaks from the cooling water connections: Shut off the cooling water supply and return line immediately.
- Provide leakproof cooling water connections.

- Open the shut-off valves in the water line on the temperature control unit (if present) and on the building side.
- Check the connections for leaks.

2.8 Preparations for operation

2.8.1 Unscrewing/activating the leveling feet (if any)

WARNING

The leveling feet are not unscrewed/activated before switching on the temperature control unit

DEATH OR SERIOUS INJURY DUE TO CRUSHING

- The parking brakes must be activated at the casters (if any) and/or the leveling feet must be unscrewed/activated before the temperature control unit is put into operation.
- The temperature control unit may move if the parking brakes of the casters (if any) are not activated and/or the leveling feet are not unscrewed/activated.

Always unscrew/activate the leveling feet before switching on the temperature control unit. Uneven floors can be compensated by adjusting these leveling feet.

PROCEDURE

- Verify that the parking brakes of the casters (if any) have been activated.
- Unscrew the leveling feet.
- Compensate uneven floors by adjusting these leveling feet, if necessary. Use a spirit level to horizontally align the temperature control unit.
- Tighten the lock screws on the leveling feet after aligning the temperature control unit. This prevents the leveling feet from changing their height during operation.

2.8.2 Opening/closing the bypass valve

Some temperature control units are fitted with an adjustable bypass to protect fragile applications (e.g. a glass apparatus). To find out whether your temperature control unit is equipped with an adjustable bypass, refer to the “Wiring diagram”. → From page 65, section **»Annex«**.

The **>Bypass valve<** [62] is located on top of the temperature control unit. The set pressure is displayed on the display. → Page 35, section **»Display«**. The **>Bypass valve<** [62] must be fully open before the circulation starts:

- at the initial filling of the machine;
- when switching to another thermal fluid;
- when switching to another application.

Opening and closing the bypass valve

INFORMATION

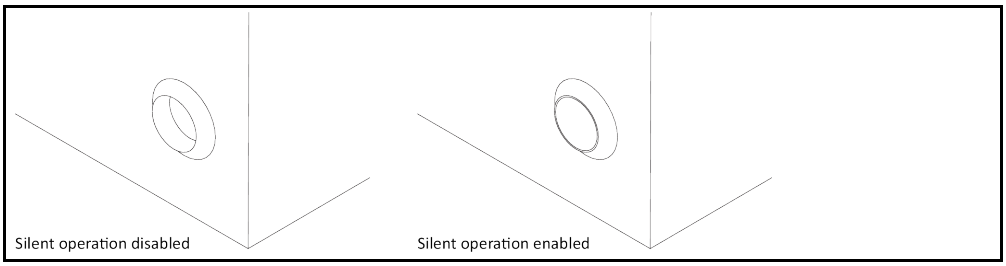
Opening the bypass valve:
Open the valve by turning it counterclockwise (turn 90° left as far as it will go).
Closing the bypass valve:
Close the valve by turning it clockwise (turn 90° right as far as it will go).

PROCEDURE

- Check whether the **>Bypass valve<** [62] is open.
- Open the **>Bypass valve<** [62] by turning it counterclockwise (turn 90° left as far as it will go).

2.8.3 Enable / Disable silent operation (optional)

Enable / disable silent operation



Enabling silent operation on the temperature control unit reduces the noise level by decreasing the pump capacity. For the exact position of the switch **>Change pump speed<** [114] please refer to the "Wiring diagram". → From page 65, section **»Annex«**.

PROCEDURE

- To disable silent operation, press the switch **>Change pump speed<** [114] on the temperature control unit. The pumping capacity and the noise level are increased.
- To enable silent operation, press the switch **>Change pump speed<** [114] on the temperature control unit again. The pumping capacity and the noise level are reduced.
- Select the silent operation mode by enabling and disabling.

2.8.4 Installing collecting container

PROCEDURE

- Install a suitable hose at the **>overflow<** [12] on the temperature control unit (if present). The hose must be compatible with the thermal fluid and the temperature.
- Put the other end of the hose in a suitable collecting container.

2.8.5 Connecting the functional ground

PROCEDURE

- If required, connect the temperature control unit's **>Functional ground terminal<** [87] to the building's grounding point. Depending on the design, there may be another functional ground terminal on the switch cabinet. Use a ground strap in each case. For the exact positions please refer to the wiring diagram. → From page 65, section **»Annex«**.

2.9 Connecting externally closed application

Observe the wiring diagram. → From page 65, section **»Annex«**.

2.9.1 Connecting an externally closed application

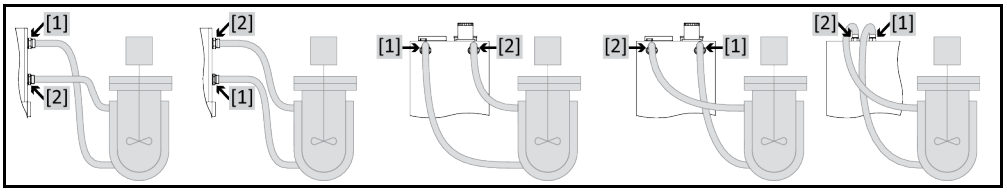
NOTE

Overpressure in the application (e.g. > 0.5 bar (g) with glass apparatus)

MATERIAL DAMAGE TO THE APPLICATION

- Observe the max. system pressure specified in the data sheet of the temperature control unit. → From page 65, Section **»Annex«**.
- Provide an overpressure protective device to prevent damage to the application.
- Do not install valves/quick-release couplings in the feed/discharge lines from the temperature control unit to the application and from the application to the temperature control unit.
- The specified maximum discharge pressure can be briefly exceeded: In case of a sudden shut-off of the system return or an unexpected error occurring.
- **If valves/quick-release couplings are required:**
- Install an overpressure protection device on the application itself (at the feed and discharge lines).
- Install a bypass upstream of the valves/quick-release couplings for the application.
- Matching accessories (e.g. bypasses to reduce pressure) can be found in the Huber catalog.

Example: Connecting an externally closed application



To enable your application to be operated correctly and eliminate air bubbles from the system, you must ensure that the **>Circulation flow<** [1] connection from the temperature control unit is attached to the lower connection point of the application and the **>Circulation return<** [2] into the temperature control unit is attached to the higher connection point of the application. Make sure that on temperature control units without **>Expansion vessel<** [18], the lower connection point of the application is at the same level or slightly higher than the **>Circulation return<** [2] connection.

PROCEDURE

- Remove the screw plugs from the **>Circulation flow<** [1] and **>Circulation return<** [2] connections.
- Then connect your application to the temperature control unit using suitable thermal fluid hoses. Observe the table with the wrench sizes. → Page 26, section **»Wrench sizes and torques«**.
- Check the connections for leaks.

2.10 Connecting to the power supply

INFORMATION

Based on local circumstances, it may be that you need to use an alternative power cable instead of the supplied original power cable. Do not use a power cable that is longer than **3 m** to be able to disconnect the temperature control unit at any time from the mains. Have the mains cable only replaced by a qualified electrician.

2.10.1 Connection using socket with protective earth (PE)

DANGER

Connecting to a power socket without protective earth (PE)

MORTAL DANGER FROM ELECTRIC SHOCK

- Always connect the temperature control unit to safety sockets (PE).

DANGER

Damaged power cable/power cable connection

MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power supply cable/power supply connection replaced and inspected by an electrician.
- Do not use a power cable that is longer than **3 m**.

NOTE

Incorrect power supply connection

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Your building's existing power supply voltage and frequency must match the data provided on the rating plate of the temperature control unit.

INFORMATION

In case of uncertainties about an existing protective earth (PE), have the connection inspected by an electrician.

2.10.2 Connection via hard wiring

DANGER

Connection/adjustment to the power supply not carried out by an electrician

MORTAL DANGER FROM ELECTRIC SHOCK

- Have the connection/adjustment to the power supply carried out by an electrician.

DANGER

Damaged power cable/power cable connection

MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power supply cable/power supply connection replaced and inspected by an electrician.
- Do not use a power cable that is longer than **3 m**.

NOTE

Incorrect power supply connection

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Your building's existing power supply voltage and frequency must match the data provided on the rating plate of the temperature control unit.

3 Function description

3.1 Function description of the temperature control unit

3.1.1 General functions

Circulating coolers are temperature control units, which are mainly used to dissipate process heat as well as a cost effective alternative to cooling water (drinking water).

Due to **powerful refrigeration engineering**, **short cooling rates** can be achieved.

Temperature control units with “P” in model name: This temperature control unit is particularly suitable for applications requiring high pressure drops.

3.1.2 Other functions

The integrated **speed-controlled pump** enables the **speed** or the **pressure** to be controlled and hence optimally matched to the specified application. The following data are displayed on the **display with OLED technology** depending on the model and options: Temperature of the internal and external temperature sensor, setpoint, pressure and flow rate. Use the membrane keyboard to enter the controller settings.

The temperature control unit can easily be integrated in many laboratory automation systems using the **standardly existing RS232 and USB interfaces on the controller** and the **optional ECS and POKO interfaces**.

An external Pt100 sensor can be connected via the optional **Pt100 process display sensor port**. The temperature measured is displayed on the display.

Temperature control units with a heater have an **overtemperature protection to DIN EN 61010-2-010 that is independent** of the control circuit.

3.2 Information on the thermal fluids

⚠ CAUTION

Non-compliance with the safety data sheet for the thermal fluid to be used

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected.
- Observe the local regulations/work instructions.
- Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping because floor and work area are contaminated. Clean the workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.

NOTE

Non-compliance with the compatibility between the thermal fluid and your temperature control unit

MATERIAL DAMAGE

- Observe the classification of your temperature control unit according to DIN 12876.
- Ensure the following materials are resistant with respect to the thermal fluid: Stainless steel 1.4301/ 1.4401 (V2A), copper, nickel, FKM, red bronze/brass, silver solder and plastic.
- The maximum viscosity of the thermal fluid must not exceed 50 mm^2/s at the lowest working temperature!
- The maximum density of the thermal fluid may not exceed 1 kg/dm^3!

NOTE

Mixing different thermofluids in a thermal fluid circuit

PROPERTY DAMAGE

- Do **not** mix different types of thermofluid (such as mineral oil, silicone oil, synthetic oil, water, etc.) in a thermofluid circuit.
- The thermal fluid circuit **must** be rinsed when changing from one type of thermal fluid to another. No residues of the previous type of thermal fluid may remain in the thermal fluid circuit.

INFORMATION

Only water or a water-ethylene glycol mixture are approved as thermal fluid. We recommend the ethylene glycols listed in the Huber catalogue in the specified mixing ratio.

Thermal fluid: Water

Designation	Specification
Calcium carbonate per liter	≤ 1.5 mmol/l; corresponds to a water hardness of: ≤ 8.4 °dH (soft)
pH value	between 6.0 and 8.5
Ultrapure water, distillates	Add 0.1 g of sodium carbonate (Na_2CO_3) per liter
Not approved water	Distilled, deionized, demineralized, chloric, ferruginous, ammoniacal, contaminated or untreated river water or sea water
Volume circulated (at least)	3 l/min.
Thermal fluid: Water without ethylene glycol	
Use	≥ +3 °C
Thermal fluid: Water-ethylene glycol mixture	
Use	< +3 °C
Thermal fluid composition	The mixture's temperature must be 10 K below the permissible min. temperature. For the permissible temperature range, refer to the datasheet. → From page 65, section **»Annex«**.

3.3 To be noted when planning the test

INFORMATION

Observe the intended operation. → Page 13, section **»Proper operation«**.

The focus is on your application. Bear in mind that system performance is influenced by heat transfer, temperature, thermal fluid viscosity, volume flow, and flow speed.

- Make sure the electrical connection is adequately dimensioned.
- The installation location of the temperature control unit should be selected so as to ensure adequate fresh air, even with water-cooled chillers.
- The maximum flow pressure of a temperature control unit must be taken into account in case of pressure-sensitive applications, such as glass reactors.
- Cross-section reduction or shut-off in the thermal fluid circuit must be avoided. Take appropriate measures to limit the pressure in the system. Observe the data sheet of your glass apparatus and the data sheet of your temperature control unit. → From page 65, section **»Annex«**.
- Check whether it is necessary to use an external bypass for temperature control units without pressure limitation.
- In order to prevent the risk of overpressure in the system, the thermal fluid must always be adjusted to room temperature before switching off. This will prevent damage to the temperature control unit or the application. Any isolating valves must remain open (pressure equalization).
- Select the thermal fluid to be used in such a way that it not only permits the minimum and maximum working temperature but is also suitable with regard to fire point, boiling point, and viscosity. In addition, the thermal fluid must be compatible with all the materials in your system.
- Avoid bending the temperature control and cooling water hoses (if required). Use suitable angle pieces and lay the hose connections with a large radius. Take the minimum bending radius from the data sheet of the temperature control hoses used.
- The selected hose connections must be able to withstand the thermal fluid, the working temperatures and the admissible maximum pressure.

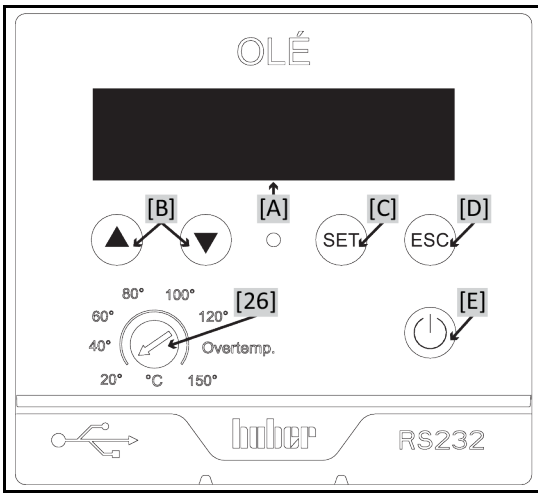
- Check the hoses at regular intervals for any material fatigue (e.g. cracks, leaks).
- Keep the temperature control hoses as short as possible
  - The inside diameters of the temperature control hoses must correspond at least to the pump connections. Select bigger inside diameters for longer line lengths to compensate for pressure loss in the piping.
  - The viscosity of the thermal fluid determines the pressure drop and influences the temperature control result, especially at low working temperatures.
  - Too small connectors and couplers and valves can generate significant flow resistance. Your application will therefore be slower to reach its design temperature.
- Basically, you should only use the thermal fluid recommended by the manufacturer and only within the usable temperature and pressure range.
- The application should be roughly at the same height of or below the temperature control unit if the temperature control is close to the boiling temperature of the thermal fluid.
- Fill the temperature control unit slowly, carefully and evenly. Wear the necessary personal protective equipment, such as goggles, heat-proof and chemically resistant gloves, etc.
- The temperature control circuit must be vented after filling and setting all required parameters. This is required to ensure trouble-free operation of the temperature control unit and hence your application.

INFORMATION

For water-cooled temperature control units, please take the cooling water temperature necessary for perfect operation and the required differential pressure from the data sheet. → From page 65, section **»Annex«**.

3.4 Display and control instruments

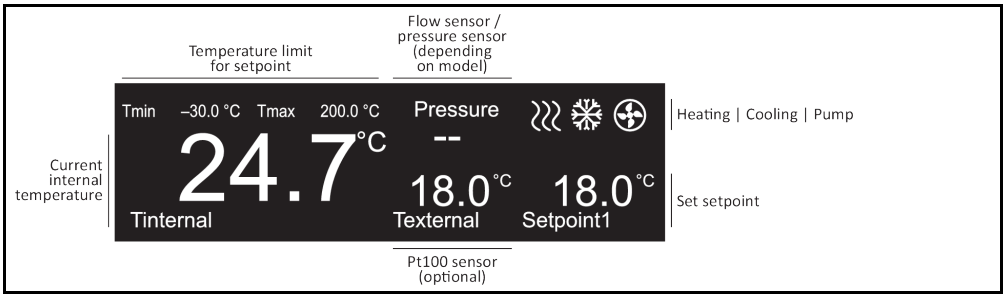
The control panel: Displays and keys



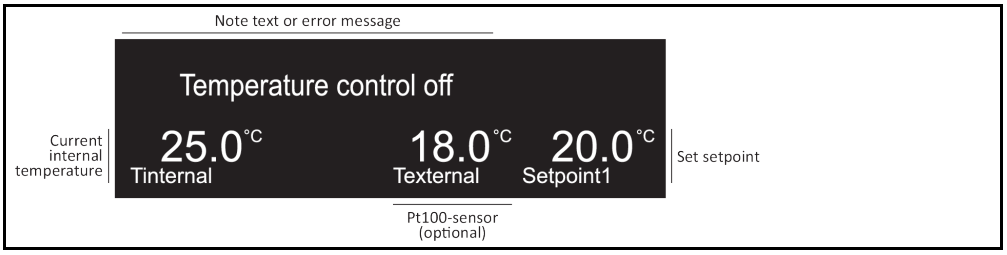
[26] Overtemperature protection (depending on model)
[A] Display
[B] Arrow keys
[C] SET key
[D] ESC key
[E] Start/Stop key

3.4.1 Display

Home screen: Temperature control is active



Home screen: Temperature control is inactive or an error message is displayed

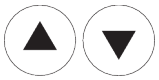


Home screen: Explanation of the display

Designation	Description
Temperature limit for setpoint	Display of the setpoint limit. You can set the setpoint only within this range. You can change this limit in the menu item “Protection Options” and then “Setpoint Minimum” and “Setpoint Maximum". Do take the thermal fluid used and the material to be tempered into account when changing these settings. → Page 38, section **»Menu function«**.
Flow sensor / pressure sensor (optional, depending on model)	Display for the measured values of the built-in flow or pressure sensor. This feature is optional depending on the model and is not available in KISS controllers and other temperature control units. Use the menu item “Sensor Configuration” under “Flow Sensor / Pressure Sensor Display” to change the display or to turn it on and off. → Page 38, section **»Menu function«**.
Heating	This symbol is displayed when the temperature control unit heats the thermal fluid. (Only for temperature control units with heating)
Cooling system	This symbol is displayed when the temperature control unit cools down the thermal fluid.
Pump	The symbol is displayed when the pump in the temperature control unit runs.
Current internal temperature	Display of the current thermal fluid temperature. The temperature is measured and controlled by the internal temperature sensor.
Pt100 sensor (optional)	Displays the measured value of the external Pt100 process display sensor. This display requires that: 1) the temperature control unit is equipped with a Pt100 port, 2) a Pt100 process display sensor has been attached, 3) the Pt100 process display sensor was placed in the application. You can turn on and off the display in the menu item “Sensor Configuration” under “Display external Pt100 sensor” only if the corresponding interface has been installed. → Page 38, section **»Menu function«**.
Set setpoint	Displays the setpoint set.
Info text or error message	Displays an info text or error message.

3.4.2 Control instruments

3.4.2.1 Arrow keys



Use the **>Arrow keys<** [B] to enter values (⊙ (+) or ⊙ (-)), to select a menu item (⊙ (arrow left) or ⊙ (arrow right)) or to select a different menu item (⊙ (up) or ⊙ (down)). Pressing an arrow key for an extended period changes a value faster. Pressing both **>Arrow keys<** [B] simultaneously calls up the main menu.

3.4.2.2 SET key

Pressing the **>SET key<** [C] on the home screen switches directly to the screen where you can enter the setpoint temperature. It allows you to quickly modify the setpoint temperature. The **>SET key<** [C] is also used to get to a selected menu item or to confirm changes.

3.4.2.3 ESC key

Pressing the **>ESC key<** [D] cancels changes / entries. The display changes to the previous screen without saving a change / entry. Pressing the **>ESC key<** [D] brings you back to the previous screen, all the way to the home screen. Press the **>ESC key<** [D] to acknowledge the alarm sound of an error.

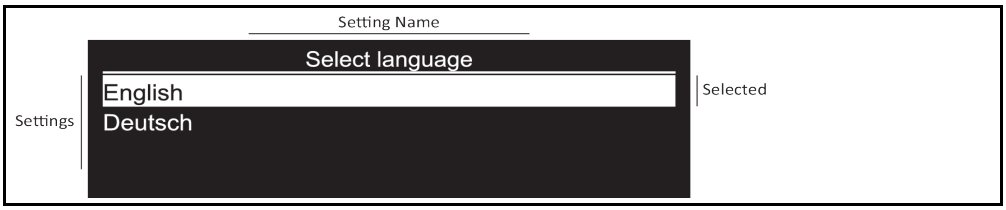
3.4.2.4 Start/Stop key

Start or stop the thermoregulation by pressing the **>Start/Stop button<** [E].

3.4.3 Adjusting settings

Exemplary setting of a numerical value

Exemplary setting by text selection



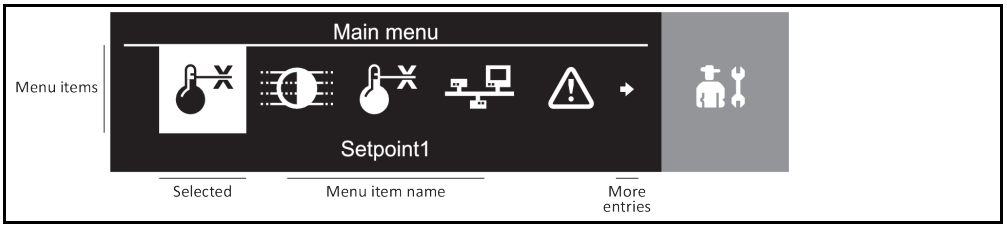
There are two ways to adjust settings:

Numerical settings:
Use the **>Arrow keys<** [B] (⊙ (+) or ⊙ (-)) and confirm an entry by pressing the **>SET key<** [C]. Pressing an arrow key for an extended period changes a value faster.

Text selection:
Select the text via the **>Arrow keys<** [B] (⊙ (up) or ⊙ (down)) and confirm your entry by pressing the **>SET key<** [C].

3.5 Menu function

Main menu



Pressing both **>Arrow keys<** [B] simultaneously calls up the main menu. Some menu items cannot be selected depending on the configuration of the temperature control unit.

Overview of the menu items

Display	Description	KISS	OLÉ
Setpoint 1	Sets the setpoint. Use the **>Arrow keys<** [B] to change the setpoint.	X	X
Adjusting brightness	Adjusting the brightness of the OLED display. Use the **>Arrow keys<** [B] to change the brightness.	X	X
Sensor configura-tion	This menu item makes available: 1) Adjustment of the internal sensor (input options: Offset (K)) 2) Adjustment of the external sensor (input options: Offset (K)) 3) Temperature unit (choose between “Celsius” and “Fahrenheit”) 4) Mode (choose between “Internal temperature control”, “Venting” and “Circulation” 5) Display of external Pt100 sensor – (activating the display of an external Pt100 pro-cess display sensor) 6) Flow sensor / pressure sensor display – (activating the display of the optional flow sensor / pressure sensor)	 X O X X O –	 X O X X O M
Interfaces	This menu item makes available: 1) RS232 1 (setting of “Baud rate” and “Mode” (HuberBus)) 2) RS232 2 (setting of “Baud rate” and “Mode” (HuberBus)) 3) USB device (setting of “Baud rate” and “Mode” (HuberBus)) **Only Huber service technicians may use the “STBus” mode.** 4) Floating contact (selection of “Off”, “Alarm” and “Unipump/PCS”) 5) External control signal (selection between “Off”, “Setpoint2” and “Standby”)	 X X X – –	 X O X O O
Protection Options	This menu item makes available: 1) Setpoint2 (to input the second setpoint) 2) Setpoint minimum (to input the lower limit of the adjustable setpoint) 3) Setpoint maximum (to input the upper limit of the adjustable setpoint) 4) Power failure automatic (select between “Off” and “Automatic”)	 – X X X	 O X X X
System	This menu item makes available: 1) Heating output (only with temperature control units; setting in %) 2) Select language (choose between “English” and “German”) 3) Cooling bath (select between “Without cooling bath” (Off), “With cooling bath and com-mon power supply” (On) and “With cooling bath and separate power supply” (On)) 4) System information (display different serial numbers (Serial Number) and version statuses) 5) Service menu (only for Huber service technicians. This submenu is password protected) 6) Factory settings (choose between “Continue” and “Cancel”)	 X X M X X X	 M X – X X X
X = standard, O = optional, M = model-dependent– = not possible			

3.6 Functional examples

3.6.1 Selecting a language

PROCEDURE

- Press both **>Arrow keys<** [B] to invoke the main menu.
- Use the **>Arrow keys<** [B] to select the menu item “System”.
- Press the **>SET key<** [C] to confirm your selection.
- Use the **>Arrow keys<** [B] to select the submenu “Select Language”.
- Press the **>SET key<** [C] to confirm your selection.
- Use the **>Arrow keys<** [B] to select the desired language.
- Press the **>SET key<** [C] to confirm your selection.
- Press the **>ESC key<** [D] twice to return to the home screen.

3.6.2 Setting the setpoint

PROCEDURE

Using the home screen to set the setpoint

- Press the **>SET key<** [C].
- Use the **>Arrow keys<** [B] (△ (+) or ▽ (-)) to set the new setpoint.
  The longer you keep an arrow key pressed the faster the value changes.
- Press the **>SET key<** [C] to confirm your input.

3.6.3 Changing the Auto-Start function

Following a power outage (or when switching on the temperature control unit), this function can be used to determine how the temperature control unit is supposed to respond.

Auto-Start function is turned off
The temperature control is started only by manual input when the temperature control unit is turned on.

Auto-Start function is turned on
The temperature control unit is set to the same state it was in before the power outage. For example, before the power outage: Thermoregulation is off; after power outage: Thermoregulation is off. If temperature control is active during a power outage, the process will automatically continue after the power outage.

PROCEDURE

- Press both **>Arrow keys<** [B] to invoke the main menu.
- Use the **>Arrow keys<** [B] to select the menu item “Protection Options”.
- Press the **>SET key<** [C] to confirm your selection.
- Use the **>Arrow keys<** [B] to select the submenu “Power Failure Automatic”.
- Press the **>SET key<** [C] to confirm your selection.
- Use the **>Arrow keys<** [B] to select the desired setting.
- Press the **>SET key<** [C] to confirm your selection.
- Press the **>ESC key<** [D] twice to return to the home screen.

4 Setup mode

4.1 Setup mode

CAUTION

Moving the temperature control unit during operation
SERIOUS BURNS/FREEZING OF THE HOUSING PARTS/ESCAPING THERMAL FLUID
- Do not move temperature control units that are in operation.

4.1.1 Turning on the temperature control unit

PROCEDURE

- The temperature control unit must be filled with thermal fluid before you turn it on via the **>Mains switch<** [37]. → Page 42, section **»Filling, venting and draining«**. An error message appears on the display after a short time if the temperature control unit is switched on without thermal fluid. If this is the case, switch off the temperature control unit using the **>Mains switch<** [37] and fill it.
- Switch on the temperature control unit using the **>Mains switch<** [37]. The float switch monitors the thermal fluid level. For this, the float switch is automatically pressed down. The buoyancy of the float forces it upwards only when thermal fluid is filled and thus the test is passed. The test may generate some sounds.
  Circulation and temperature control are turned off.

4.1.2 Turning off the temperature control unit

PROCEDURE

- Warm the thermofluid to room temperature.
- Stop the thermoregulation.
- Switch off the temperature control unit using the **>Mains switch<** [37].

4.1.3 Setting the overtemperature (OT) protection

DANGER

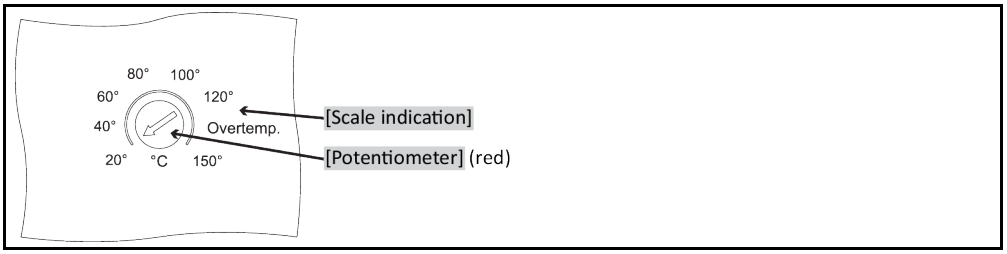
The overtemperature protection is set higher than the ignition temperature of the thermal fluid used
MORTAL DANGER FROM FIRE
- The overtemperature protection must be correctly set to the thermal fluid you are using.
- Always observe the safety data sheet of the thermal fluid.
- Set the cut-out value of the overtemperature protection at least 25 K below the fire point of the thermal fluid.

INFORMATION

The usable working temperature range of the thermal fluid may be smaller if the overtemperature protection is correctly set. Due to tolerances, the overtemperature protection can trigger when the temperature is controlled near the upper operating temperature limit.

4.1.3.1 General information on the overtemperature protection

Example of a potentiometer at the temperature control unit

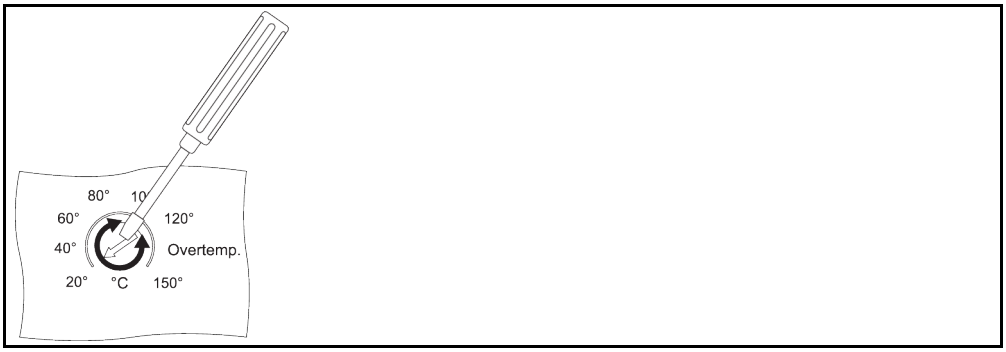


The overtemperature protection is installed only in temperature control units that have a heater. The flow temperature is monitored to ensure the safety of your system. It is set immediately after you have filled the system with thermal fluid.

Upon delivery, the cut-out value of the overtemperature protection is set to 40 °C. An alarm is triggered by the temperature control unit shortly after turning on the power if the temperature of the thermal fluid just filled is higher than the cut-out value set for the overtemperature protection. Set the overtemperature protection to the thermal fluid you are using. Please note: The printed scale can deviate by - 25 K from the set cut-out value.

4.1.3.2 Setting the overtemperature protection

Setting the cut-out value



INFORMATION You need a screwdriver (flat blade 1.0 x 5.5) to set the cut-out value of the overtemperature protection.

PROCEDURE

- Use a screwdriver to set the cut-off value on the potentiometer. The cut-out value must be set to match the thermal fluid you are using. It is not required to switch on the temperature control unit.

4.1.4 Testing the overtemperature protection for functionality

DANGER

Overtemperature protection (OT) does not trip

MORTAL DANGER FROM FIRE

- Test the response of the device every month and after each change of the thermal fluid in order to assure proper functioning.

NOTE

The steps below are carried out without permanent monitoring of the temperature control unit

DAMAGE TO AND IN THE VICINITY OF THE TEMPERATURE CONTROL UNIT

- The following actions may only be carried out while constantly monitoring the temperature control unit and the application!

INFORMATION The overtemperature protection is installed only in temperature control units that have a heater. You need a sufficiently large-sized screwdriver to check the overtemperature protection for functionality.

Steps to test the correct functioning of the overtemperature protection:

PROCEDURE

- Note down the cut-out value of the overtemperature protection set on the potentiometer.
- Switch on the temperature control unit.
- Enter a setpoint (room temperature). → Page 39, Section **»Setting the setpoint«**.
- Start the temperature control process by pressing the **>Start/Stop button<** [E].
- Use a screwdriver to set the new cut-off value on the potentiometer. This cut-out value must be **below** the indicated internal temperature. The overtemperature protection is triggered.
- Turn off the temperature control unit.
- Use a screwdriver to reset the cut-off value on the potentiometer to the original value.

INFORMATION Immediately take the temperature control unit out of operation if the overtemperature protection is not triggered. Immediately contact Customer Support. → Page 63, section **»Contact data«**. Do not put the temperature control unit back into operation.

4.2 Filling, venting and draining

Observe the wiring diagram. → From page 65, section **»Annex«**.

CAUTION

Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS

- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

NOTE

During an active circulation, the thermal fluid circuit is shut off by shut-off valves

MATERIAL DAMAGE TO THE CIRCULATING PUMPS INSTALLED IN THE TEMPERATURE CONTROL UNIT

- Do not close the thermal fluid circuit during an active circulation by means of shut-off valves.
- Warm the thermal fluid to room temperature before stopping the circulation.

INFORMATION

Not all temperature control units are equipped with the same combination of connections/drains. Skip the step in the procedure if the connection / drain is not available on your temperature control unit.

4.2.1 Filling and venting externally closed application

CAUTION

Non-compliance with the safety data sheet for the thermal fluid to be used

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected.
- Observe the local regulations/work instructions.
- Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping because floor and work area are contaminated. Clean the workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.

NOTE

Thermal fluid flowing over into the temperature control unit

MATERIAL DAMAGE

- Shut down the temperature control unit immediately.
- Isolate the temperature control unit from the power supply.
- Have the temperature control unit only serviced and cleaned by staff trained by Huber. Follow the instructions for the proper disposal. → Page 15, section **»Proper disposal of resources and consumables«**.

NOTE

Semi-automatic venting

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- An elevated tolerance time for the pressure drop can damage the pump if the thermal fluid level in the system is also too low.
- Constantly observe the thermal fluid level in the **>Sight glass<** [23]. Fill up the thermal fluid during the venting phase so the thermal fluid level in the **>Sight glass<** [23] does not fall below the minimum mark.

NOTE

The >Bypass valve< [62] (if installed) is not adapted to the external application

MATERIAL DAMAGE TO THE EXTERNAL APPLICATION

- A closed **>Bypass valve<** [62] can cause the pressure in the thermal fluid circuit to become too high for the external application used. It may cause the thermal fluid to overflow from the external application and/or damage the external application.
- Initial filling, switching to another thermal fluid or another external application: The **>Bypass valve<** [62] **must be fully open** before the circulation is started. As a result, the pressure in the thermal fluid circuit is at the lowest point.
- Note the pressure gauge when starting the circulation. The permissible pressure of your external application must not be exceeded.

INFORMATION

Calculate whether the capacity of the **>Expansion vessel<** [18] can absorb the expansion volume during operation. Assume the following volumes for this calculation: [Minimum filling capacity of the temperature control unit] + [Volume of the thermal fluid hoses] + [Jacket volume of your application] + [10% / 100 K].

INFORMATION

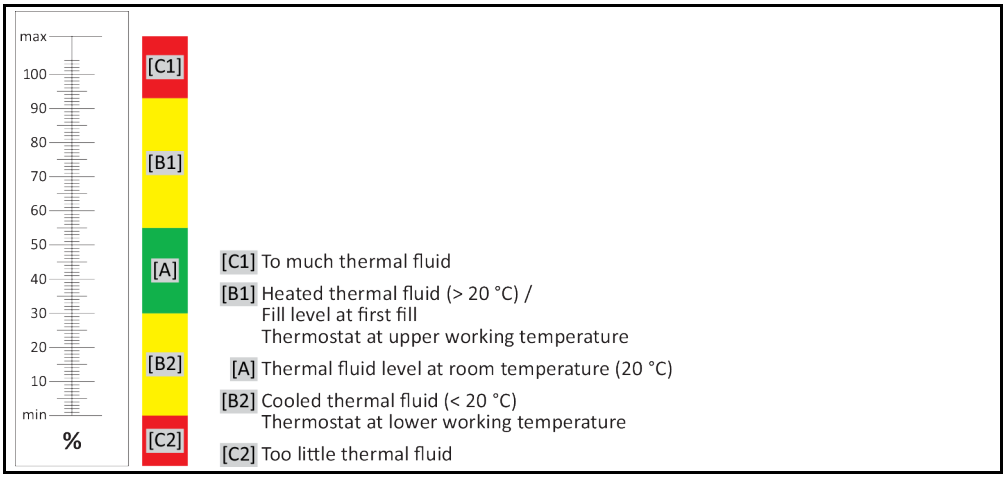
If, with externally closed applications (reactors), the fluid level in the fill level display remains the same when the pump is running and when the pump has stopped, the application has been vented.

INFORMATION

Venting must be performed especially at initial start-up and after a change of thermal fluid. This is the only way to ensure trouble-free operation.

Note that the volume expansion of the thermal fluid depends on the working temperature range you wish to work in. At the "lowest" working temperature, do not go below the **"minimum"** mark. At the "highest" working temperature, there should be no overflow from the **>Expansion vessel<** [18]. In case of overfilling, drain the excess amount of thermal fluid. → Page 44, Section **»Draining externally closed applications«**.

Fill levels in the **Sight glass<** [23]



- Please observe any measures that may be required during filling, e.g. grounding the container, the funnel and other aids.
- Fill from the lowest possible height.

PROCEDURE

- **Temperature control unit with >Bypass valve<** [62]: Check whether the **>Bypass valve<** [62] is completely open.
- **Temperature control unit with >Overflow<** [12]: Check that a hose was installed at the **>Overflow<** [12]. The other end of the hose must be inserted in a suitable collecting container. Excess thermal fluid will leak at this point when the temperature control unit is overfilled. Hose and collecting container must be resistant to the thermal fluid and the temperature.
- **Temperature control unit with >Sight glass<** [23]: Open the **>Sight glass cover<** [24]. This makes filling easier as it prevents an air cushion from forming in the **>Sight glass<** [23]. No thermal fluid may leak from the **>Sight glass<** [23] when filling!
- Manually open the **>Filling port<** [17].
- Carefully pour suitable thermal fluid, using the filling accessories (funnel and/or beaker) into the **>Filling port<** [17]. The thermal fluid flows into the temperature control unit and through the hose connections to the external application. The fill level is displayed in the **>Sight glass<** [23] (initial filling between 50 and 70 %). Follow the instructions for the proper disposal when cleaning filling accessories. → Page 15, Section **»Proper disposal of resources and consumables«**.
- **Temperature control unit with >Sight glass<** [23]: Close the **>Sight glass cover<** [24].
- Turn on the temperature control unit.
- Set the setpoint to 20 °C. → Page 39, Section **»Setting the setpoint«**.
- Start the circulation by pressing the **>Start/Stop button<** [E].
- Refill thermal fluid as needed. Observe the fill level in the **>Sight glass<** [23] for this (must not drop below 50 %). The filling/venting process is complete when the temperature control unit is filled sufficiently.

- **Temperature control unit with >Bypass valve<** [62]: Adjust the pressure in the thermal fluid circuit to the employed external application. To do this, use the **>Bypass valve<** [62] and the pressure gauge.
- Stop the circulation by pressing the **>Start/Stop button<** [E].
- Turn off the temperature control unit.
- **Temperature control unit with >Overflow<** [12]: Check the fill level in the collecting container. Empty the container when necessary and dispose of its contents properly.
- Manually close the **>Filling port<** [17].
  The temperature control unit is now filled.

4.2.2 Draining externally closed applications

CAUTION

Hot or very cold thermal fluid

SEVERE BURNS/FROSTBITE OF LIMBS

- Before draining, ensure that the thermal fluid has room temperature (20 °C).
- If, at this temperature, the thermal fluid is too viscous to be drained: Control the temperature of the thermal fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the thermal fluid when the drain is open.
- Danger of burns when draining thermal fluids at temperatures above 20 °C.
- Wear your Personal Protective Equipment for draining.
- Only drain using suitable drainage hose and collecting container. These must be compatible with the thermal fluid and its temperature.

4.2.2.1 Emptying the thermal fluid circuit

PROCEDURE

- Have a suitable container (e.g. a tub) ready to catch the thermal fluid from the **>Drain<** [8].
- **Temperature control unit with >Sight glass<** [23]**:** Remove the knurled screw from the **>Drain<** [8]. As soon as you have opened the knurled screw, the thermal fluid will flow from the external application over the temperature control unit into the container.
- Wait until no more thermal fluid flows from the **>Drain<** [8].
- **Temperature control unit with >Sight glass<** [23]**:** Have another suitable container (e.g. a tub) ready to catch the thermal fluid from the **>Residues drain<** [10].
- **Temperature control unit with >Sight glass<** [23]**:** Remove the knurled screw from the **>Residues drain<** [10]. The remaining thermal fluid will flow from the temperature control unit into the container as soon as you have opened the knurled screw.
- Wait until the temperature control unit and the external application are drained.
- Drain the external application. The description for the draining process can be found in the documents you received with the application.

4.2.2.2 Dismantling/mounting the application

PROCEDURE

Continuation of the procedure »Emptying the thermal fluid circuit«

- Disconnect the external application from the connection **>Circulation flow<** [1].
- Disconnect the external application from the connection **>Circulation return<** [2]. Leave the temperature control unit open for a while to allow it to dry out (without seal cap and with open drains).
- Connect the external application with the connection **>Circulation flow<** [1].
- Connect the external application with the connection **>Circulation return<** [2].

4.2.2.3 Closing the valves

PROCEDURE

Continuation of the procedure »Dismantling/mounting the application«

- **Temperature control unit with >Sight glass<** [23]**:** Mount the knurled screws on the **>Drain<** [8] and on the **>Residues drain<** [10].
- Remove the containers used to collect the thermal fluid. Check if the thermal fluid can be reused. Follow the instructions for the proper disposal. → Page 15, Section **»Proper disposal of resources and consumables«**.

5 Normal operation

5.1 Automatic operation

CAUTION

Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS

- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

NOTE

During an active circulation, the thermal fluid circuit is shut off by shut-off valves

MATERIAL DAMAGE TO THE CIRCULATING PUMPS INSTALLED IN THE TEMPERATURE CONTROL UNIT

- Do not close the thermal fluid circuit during an active circulation by means of shut-off valves.
- Warm the thermal fluid to room temperature before stopping the circulation.

5.1.1 Temperature control

5.1.1.1 Starting the temperature control process

The temperature control process can be started after filling and complete venting.

PROCEDURE

- With the temperature control unit turned on and the temperature control process/circulation stopped, press the **>Start/Stop button<** [E].
  Temperature control starts.

5.1.1.2 Ending the temperature control process

NOTE

When the temperature control unit is switched off, the thermal fluid temperature is higher/lower than room temperature

DAMAGE TO THE TEMPERATURE CONTROL UNIT AND THE GLASS APPARATUS/APPLICATION

- Bring the thermal fluid up to room temperature using the temperature control unit.
- Do not close the shut-off valves in the thermal fluid circuit.

Thermoregulation can be terminated at any time. Thermoregulation and circulation are switched off immediately afterwards.

PROCEDURE

- With the temperature control unit turned on and the temperature control process/circulation running, press the **>Start/Stop button<** [E].
  Temperature control stops.

6 Interfaces and data communication

NOTE

Connecting to the interfaces at the temperature control unit during operation

DAMAGE TO THE INTERFACES

- When devices in operation are connected with interfaces of the temperature control unit, interfaces may get damaged.
- Before connecting, ensure the temperature control unit and the device to be connected are turned off.

NOTE

The specifications of the interface used are not being met.

PROPERTY DAMAGE

- Only connect components that meet the specifications of the interface used.

INFORMATION

The interfaces used must meet the specifications of the generally accepted standards. For the exact position of the interfaces, please refer to the wiring diagram. → From page 65, section **»Annex«**.

INFORMATION

The use of PB commands is described in our manual “Data communication”. You can download this manual at www.huber-online.com.

INFORMATION

Information on the interfaces can be found in our manual “Interfaces”. You can download this manual at www.huber-online.com.

6.1 Data communication

The communication via the RS232 interface is a master-slave communication. The Master (e.g. PC or PLC) starts a communication and the slave (the temperature control unit) will only respond to a request.

Transmission format:
8 data bits, 1 stop bit, no parity, no handshake
These parameters are non-adjustable and cannot be changed! The baud rate can be set in a range from 9600 baud to 115200 baud.

Time response (timing):
The data flow of a command must not be interrupted. Pauses of more than 100 ms between the characters of a command result in the receiver aborting the incoming command. The temperature control unit will always send a response for a correctly received command. The next command can be sent once a complete response was received. The typical response time is less than 300 ms.

INFORMATION

You need the software “SpyControl” to transmit commands. The software can be downloaded from the download area of www.huber-online.com.

6.1.1 LAI commands

There are 3 commands to communicate LAI commands to the temperature control unit:

1. “V” (Verify) – to query the device ID,
2. “L” (limit) – to query the device limits,
3. “G" (General) – to control and query the temperature control unit.

The send commands always begin with “[M01”, answers always with “[S01”, followed by the command qualifier “V” (Verify), “L” (Limits) or “G” (General). The next two bytes specify the length or the response of the command. A check sum is transmitted to increase data safety. The checksum is the 1 byte sum of all hex values from the start character to the last character before the checksum. It is appended to the end of the command or the response and then finished off with the end character CR (“\r”, 0Dh).

Structure of a send command

Byte	Command	Response	Description
1 Byte	[	[	Start character, fix
2 Byte	M	C	Identification of the transmitter (M = Master, S = Slave)
3 bytes	0	0	Slave address, fix
4 bytes	1	1	Slave address, fix
5 bytes	V / L / G	V / L / G	Command qualifier (V = Verify, L = Limit, G = General)
6 bytes	0	1	Length of command / response (example)
7 bytes	7	4	Length of command / response (example)
n Bytes	x	x	If applicable, content; the number of bytes depends on the command
I-2 byte	C	C	Checksum (example)
I-1 byte	6	1	Checksum (example)
I byte	\r	\r	End-of-text character CR

6.1.1.1 Command “V” (Verify)

This command is provided to check the presence of a slave and query its ID.

Command structure “V” (Verify)

Byte	ASCII	Hex	Description
Master sends: **[M01V07C6\r**			
1. Byte	[	5Bh	Start character
2. Byte	M	4Dh	Master ID
3. Byte	0	30h	Slave address
4. Byte	1	31h	Slave address
5. Byte	V	56h	Command qualifier
6. Byte	0	30h	Length of data field (0)
7. Byte	7	37h	Length of data field (7)
8. Byte	C	43h	Checksum
9. Byte	6	36h	Checksum
10. Byte	\r	0Dh	End character CR
The checksum is formed from bytes 1 to 7: 5Bh + 4Dh + 30h + 31h + 56h + 30h + 37h = 1C6h = 1 byte sum = C6h The hex value C6h is appended as two ASCII characters “C” (43h) and “6” (36h).			
The slave responds: **[S01V14Huber ControlC1\r** The 13 bytes of the data set “Huber Control” plus the 7 bytes in front of the data set result in a data field length of 20 bytes = 14h bytes.			

6.1.1.2 Command “L” (Limit)

This command is used to query the setpoint limits.

Command structure “L” (Limit)

Byte	ASCII	Hex	Description
Master sends: **[M01L0F********1B\r**			
The slave responds: **[S01L17F4484E20F4484E2045\r**			

A response always includes four limit values (starting from the eighth byte):

1. Lower setpoint limit (4 bytes),
2. upper setpoint limits (4 bytes),
3. lower working range limit (4 bytes),
4. upper working range limit (4 bytes).

The working range limits are device-specific and cannot be changed. The lower setpoint limit can not be lower than the lower working range limit and the upper setpoint limit can not exceed the upper working range limit.

The two bytes before the last byte contain the checksum and the last byte of the response contains the end character (CR).

Each of the four values is expressed as a hex value. The values are signed, where 1 bit corresponds to 0.01 K. Thus a number range from 0000h to 7FFFh, i.e. from 0.00 °C to 327.67 C °, can be represented. Negative numbers are represented from FFFFh to 8000h, i.e. from -0.01 °C to -327.66 °C. Thus the four individual ASCII characters “F448” correspond to a 16-bit hex value of F448h and thus a temperature of -30 °C. → Page 48, section **»Command “G” (General)«**.

6.1.1.3 Command “G” (General)

This command transmits the most important temperatures and status information in a cycle. A modified setpoint is not stored in the permanent memory, i.e. this value is lost when switching off the machine.

Structure Command “G” (General)

Byte	ASCII	Hex	Description
Master sends: **[M01G0Dsattttpp\r**			
1. Byte	[	5Bh	Start character
2. Byte	M	4Dh	Master ID
3. Byte	0	30h	Slave address
4. Byte	1	31h	Slave address
5. Byte	G	47h	Command qualifier
6. Byte	0	30h	Length of the command: 0Dh = 13 bytes (number of bytes without checksum and end character)
7. Byte	D	44h	
8. Byte	s: C / I / O / *	43h / 49h / 4Fh / 2Ah	Temperature control mode Meaning of the characters in the send string: “C” (43h) = Circulation, switch circulation on; “I” (49h) = Turn internal temperature control on; “O” (4Fh) = Off, turn temperature control off; “*” (2 Ah) = Do not change the current state.
9. Byte	a: 0 / 1 / *	30h / 31h / 2Ah	Alarm acknowledgment Meaning of the characters in the send string: “0” (30h) = No alarm acknowledgment; “1” (31h) = Any pending alarm tone is acknowledged; “*” (2 Ah) = Do not change the current state.
10. Byte	t	tttt / ****	Query or set the setpoint Meaning of the characters in the send string: Setpoint with 16-bit resolution (2 bytes, thus 4 ASCII characters) “tttt” = 0000h (0.00 °C) to 7FFFh (327.67 °C) FFFFh (-0.01 °C) to 8000h (-327.68 °C) 0190h corresponds to +4 °C, (30h, 31h, 39h, 30h) FE70h corresponds to -4 °C (46h, 45h, 37h, 30h) “****” (2Ah, 2Ah, 2Ah, 2Ah) = no change to the setpoint, setpoint is only queried
11. Byte	t		
12. Byte	t		
13. Byte	t		

Byte	ASCII	Hex	Description
14. Byte	p	Checksum	Checksum It is generated from bytes 1 to 13.
15. Byte	p	Checksum	
16. Byte	\r	0Dh	End character CR
The slave responds: **[S01G15sattttiiiieeeepp\r**			
1. Byte	[	5Bh	Start character
2. Byte	C	53h	Slave ID
3. Byte	0	30h	Slave address
4. Byte	1	31h	Slave address
5. Byte	G	47h	Command qualifier
6. Byte	1	31h	Length of response: 15h = 21 Bytes
7. Byte	5	35h	
8. Byte	s: C / I / O	43h / 49h / 4Fh	Temperature control mode Meaning of the characters in the response string: “C” (43h) = Circulation, circulation is on; “I” (49h) = Internal temperature control is on; “O” (4Fh) = Off, temperature control is off.
9. Byte	a: 0 / 1	30h / 31h	Alarm status Meaning of the characters in the response string: “0” (30h) = No alarm; “1” (31h) = Any number other than “0” is an alarm
10. Byte	t	tttt / ****	Query or set the setpoint Meaning of the characters in the send string: Setpoint with 16-bit resolution (2 bytes, thus 4 ASCII characters) “tttt” = 0000h (0.00 °C) to 7FFFh (327.67 °C) FFFFh (-0.01 °C) to 8000h (-327.68 °C) 0190h corresponds to +4 °C, (30h, 31h, 39h, 30h) FE70h corresponds to -4 °C (46h, 45h, 37h, 30h) “****” (2Ah, 2Ah, 2Ah, 2Ah) = no change to the setpoint, setpoint is only queried
11. Byte	t		
12. Byte	t		
13. Byte	t		
14. Byte	i	iiii	Internal actual value Same format as setpoint
15. Byte	i		
16. Byte	i		
17. Byte	i		
18. Byte	e	eeee	External actual value Same format as setpoint, depends on device configuration
19. Byte	e		
20. Byte	e		
21. Byte	e		
22. Byte	p	Checksum	Checksum It is generated from bytes 1 to 21.
23. Byte	p	Checksum	
24. Byte	\r	0Dh	End character CR

Example:

The temperature control mode and the alarm status should remain unchanged (each “*”) and a setpoint of -4.00 °C (FE70) is to be set.

The master sends: **[M01G0D**FE700A\r**

The slave responds (for example): **[S01G15O0FE7009A4C504E7\r**

The temperature control unit is turned off (“O”), there is no alarm ("0"), the setpoint of -4.00 °C was set (FE70), the actual value is 24.68 °C (09A4), “C504” corresponds to -151.00 °C and indicates that no external temperature sensor is installed or connected.

6.1.2 PP commands

There is another set of commands to make the communication with the temperature control unit easy. The PP commands can be used, e.g. in conjunction with simple terminal programs. The calculation of a checksum has therefore been omitted and the commands kept very simple. Each command is terminated with Carriage Return ('\r', 0Dh) and Linefeed ('\n', 0Ah). There are read and write commands. Each correct command causes a response from the temperature control unit. Temperature and setpoint values are represented by a five-digit number, which corresponds to the temperature being expressed in hundredths of a degree (without decimal point).

Available read commands

Function	Master sends	Slave responds	Description
Read the setpoint	SP?\r\n	SP +02500\r\n	The setpoint is set to 25.00 °C.
Read the internal actual value	TI?\r\n	TI +02499\r\n	Currently, the internal actual value is 24.99 °C.
Read the external actual value	TE?\r\n	TE +02499\r\n	Currently, the external actual value is 24.99 °C.
		TE -15100\r\n	An external sensor is not connected or does not exist.
Read the temperature control mode	CA?\r\n	CA +00000\r\n	Temperature control and circulation are inactive.
		CA +00001\r\n	Temperature control and circulation are active.

Available write commands

Function	Master sends	Slave responds	Description
Setting the setpoint	SP@ -01234\r\n	SP -01234\r\n	The setpoint is set to -12.34 °C.
Starting the temperature control unit	CA@ 00001\r\n	CA +00001\r\n	The temperature control process is started.
Stopping the temperature control unit	CA@ 00000\r\n	CA +00000\r\n	The temperature control process is stopped.

7 Service/maintenance

7.1 Displays in the event of faults

An alarm signal (xx Hz) is sounded in the event of a fault and the temperature control unit displays an alarm or warning message on the OLED display.

Overview of messages

Code	Cause	Effect, measure
001	**Overtemperature alarm** The internal temperature is above the set value of the overtemperature protection. The overtemperature protection was triggered.	The internal temperature of the thermal fluid is in the upper allowable extreme range. The temperature control unit can be turned on again only when the temperature of the thermal fluid has returned to normal parameters. Check whether the thermal fluid used matches your required parameters if overtemperatures repeatedly shut down the unit.
002	**Tmax exceeded** The internal temperature is above the set setpoint limit.	The internal temperature of the thermal fluid is above the setpoint limit set in the controller. Control continues.
003	**Tmin undercut** The internal temperature is below the set setpoint limit.	The internal temperature of the thermal fluid is below the setpoint limit set in the controller. Control continues.
004	**Error float test**	Check the thermal fluid level. KISS: Is the float blocked or sticky? Please contact Customer Support if the thermal fluid level is sufficient and the float of the KISS controller moves freely.
005	**Low-level alarm** No enable signal, level alarm	Control is inactive. (Pump off, compressor off, heating off) Check the fill level of the thermal fluid. **Restart impossible until the thermal fluid level is OK.**
006	**Overpressure cutout triggered** The pressure in the condenser is too high. The overpressure cutout (pressure switch) has triggered.	Temperature and pressure increase in the condenser. An overpressure cutout (pressure switch) is installed to protect the temperature control unit against excessive pressure. **Water cooling:** a.) Is the cooling water supply correctly connected? b.) Is the suction strainer (dirt trap) clogged? c.) What is the cooling water temperature, the cooling water flow rate and the cooling water pressure? **Air cooling:** a.) Is the heat exchanger or the grille dirty? b.) Does the fan turn if the cooling machine is switched on? If the fan does not turn: Contact Customer Support.
009 **011**	**Sensor F1 short** **Sensor F2 short** Short-circuit at the internal temperature sensor F1 or at the external temperature sensor F2.	Control is inactive. (Pump off, compressor off, heating off) **Check the sensor.**
010 **012**	**Sensor F1 open** **Sensor F2 open** The internal temperature sensor F1 or the external temperature sensor F2 is open.	Control is inactive. (Pump off, compressor off, heating off) **Check the sensor.**

Code	Cause	Effect, measure
033	**Error EP0 (Flash)**	Please contact Customer Support.
034	**Error EP1 (EEPROM)**	
035	**Error EP2 (NVRAM)**	
036	**Synchronization**	
037	**Parameters not equal**	
038	**Invalid status**	
039	**Error safety chip**	
042	**Pump protection activated** The pump motor is overheated.	Check the ambient conditions. Check the viscosity of the thermal fluid. Turn the temperature control unit off and let it cool down.

7.2 Maintenance

DANGER

Cleaning/maintenance while the temperature control unit is operating

MORTAL DANGER FROM ELECTRIC SHOCK

- Stop an ongoing temperature control process.
- Turn off the temperature control unit.
- Also disconnect the temperature control unit from the power supply.

NOTE

Performing maintenance work not described in these operation manual

MATERIAL DAMAGE ON THE TEMPERATURE CONTROL UNIT

- Please contact Huber for maintenance work that is not described in these operation manual.
- Maintenance work not described in these operation manual is reserved for qualified specialists trained by Huber.
- Safety-relevant components may only be replaced by equivalent ones. The specified safety values for the respective component must be observed.

7.2.1 Function check and visual inspection

Inspection intervals

Cooling*	Description	Maintenance interval	Comment	Person responsible
A/W	Visually inspect hoses and hose connections	Prior to switching on the temperature control unit	Exchange leaking hoses and hose connections prior to switching on the temperature control unit. → Page 53, section **»Replacing temperature control or coolant hoses«**.	Operating company and / or operators
A/W	Check the fill level in the collecting container at the **>Overflow<** [12] (if present)	Prior to switching on the temperature control unit	Check the fill level in the collecting container. Empty as required. Follow the instructions for the proper disposal of thermal fluid. → Page 15, section **»Proper disposal of resources and consumables«**.	Operating company and / or operators
A/W	Inspection in accordance with the F-Gas Directive	In accordance with the F-Gas Directive	→ Page 18, section **»Temperature control units with fluorinated greenhouse gases/refrigerants«**.	Operating company
A/W	Check the power supply cable	Prior to switching on the temperature control unit or on relocation	Do not start the temperature control unit if the power supply cable is damaged.	Qualified electrician (BGV A3)
A	Clean the perforated sheet	As required	Clean the perforated sheet of the temperature control unit with a damp cloth	Operating company

Cooling*	Description	Maintenance interval	Comment	Person responsible
A/W	Thermal fluid inspection	As required	–	Operating company and / or operators
A/W	Check the mechanical seals	Monthly	→ Page 58, section **»Inspect the mechanical seal«**.	Operating company and / or operators
A	Check the liquefier fins	As required, after 3 months at the latest	→ Page 54, section **»Cleaning the liquefier fins«**.	Operating company and / or operators
W	Check the hat-type strainer (dirt trap)	As required, after 3 months at the latest	→ Page 55, section **»Cleaning the hat-type strainer/dirt trap«**.	Operating company and / or operators
A/W	Overtemperature protection (OT) - functional check	Every month or after changing the thermal fluid.	→ Page 40, section **»Setting the overtemperature (OT) protection«**.	Operating company and / or operators
A/W	Check the temperature control unit for damage and stability	Every 12 months or after a change of location	–	Operating company and / or operators
W	Check the cooling water quality	Every 12 months	Descale the cooling water circuit as required. Documentation on water quality is available at: www.huber-online.com	Operating company and / or operators
A/W	Exchange safety-relevant electric and electromechanical components	20 years	Have the exchange only carried out by certified personnel (such as Huber service engineers). Please contact Customer Support. → Page 63, section **»Contact data«**.	Operating company
*A = Air cooling; W = Water cooling; U = Applicable only for Unistats				

7.2.2 Replacing temperature control or coolant hoses

Replace defective temperature control and/or coolant hoses **before** turning on the temperature control unit.

7.2.2.1 Replacing temperature control hoses

PROCEDURE

- Drain the temperature control unit. → Page 44, section **»Draining externally closed applications«**.
- Replace defective temperature control hoses. Observe the proper disposal. → Page 15, section **»Proper disposal of resources and consumables«**.
- Reconnect your external application. → Page 30, section **»Connecting externally closed application«**.
- Fill the temperature control unit with thermal fluid. → Page 42, section **»Filling and venting externally closed application«**.
- Vent the temperature control unit. → Page 42, section **»Filling and venting externally closed application«**.
- Restart the temperature control unit in normal mode.

7.2.2.2 Replacing coolant hoses

PROCEDURE

- Drain the cooling water. → Page 61, section **»Draining the cooling water«**.
- Replace the defective coolant hoses. Follow the instructions for the proper disposal. → Page 15, section **»Proper disposal of resources and consumables«**.
- Reconnect the temperature control unit to the building's cooling water supply. → Page 27, section **»Temperature control units with water cooling«**.
- Restart the temperature control unit in normal mode.

7.2.3 Cleaning the liquefier fins

Valid for air-cooled temperature control units only

CAUTION

Manual cleaning

RISK OF BEING CUT ON THE LIQUEFIER FINS

- Wear suitable cut-resistant gloves for cleaning work.
- Depending on the ambient conditions, use cleaning equipment such as vacuum cleaners and/or a hand brush/brush. Follow the local regulations when cleaning. Do not clean the liquefier fins in a clean room with items like a brush and do not use a vacuum cleaner without an extra-fine particle filter.

NOTE

Cleaning using pointed or sharp-edged tools

DAMAGE TO THE LIQUEFIER FINS

- Clean the liquefier fins using suitable cleaning appliances.

INFORMATION

Make sure there is adequate ventilation (removal of waste heat, fresh air supply) for the temperature control unit, in case of **air cooling, maintain wall clearance**. → Page 20, section **»Exemplary illustrations of the cooling variants«** and → Page 23, section **»Ambient conditions«**.
The liquefier fins must be cleaned (dust) from time to time as only then will the temperature control unit perform at its maximum cooling capacity.

Identify the position of the ventilation grille, usually located on the front. With some temperature control units, the ventilation grilles on the side wall, rear or on the underside (table units) of the temperature control unit.

PROCEDURE

Ventilation grille on the front/rear or on a side wall

- Turn off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Remove the ventilation grille to create unhindered access to the liquefier fins.
- Clean the liquefier fins using suitable cleaning appliances. Observe the local regulations and ambient conditions when selecting cleaning appliances.
- Make sure the liquefier fins are not damaged or deformed as this will impair the air flow.
- Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Turn on the temperature control unit.

PROCEDURE

Ventilation grille on the underside (table-top units)

NOTE

Cleaning of liquefier fins at the underside when the temperature control unit is filled

DAMAGE CAUSED BY THERMAL FLUID PENETRATING THE TEMPERATURE CONTROL UNIT

- Empty the temperature control unit before cleaning the liquefier fins at the underside of the temperature control unit.

- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Drain the thermal fluid from the temperature control unit. → Page 44, section **»Draining externally closed applications«**.
- Tilt the temperature control unit to remove the grille (if available) in front of the liquefier fins.
- Clean the liquefier fins using suitable cleaning appliances. Observe the local regulations and ambient conditions when selecting cleaning appliances.
- Make sure the liquefier fins are not damaged or deformed as this will impair the air flow.
- Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Refill the temperature control unit with thermal fluid. → Page 42, section **»Filling and venting externally closed application«**.

7.2.4 Cleaning the hat-type strainer/dirt trap

Valid for water-cooled temperature control units only

NOTE

Building-side isolating valves are not closed

DAMAGE BY FLOODING OF ROOMS

- Close the building-side isolating valves of the cooling water supply and return line.
- Place a collecting container below the cooling water supply [13], [14] and [15] (if installed).

INFORMATION

Depending on the water quality, regular checking and cleaning of the strainer at the **>Cooling water inlet<** [13] is necessary.
Carry out the steps “Draining the cooling water circuit”, “Dismantling the cooling water inlet”, “Cleaning the hat-type strainer/dirt trap” and “Installing the cooling water inlet” in succession.

INFORMATION

We would be pleased to also offer you training for the Service. Contact our Customer Support → page 63, section **»Contact data«**.

7.2.4.1 Draining the cooling circuit

PROCEDURE

- Turn off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Close the building-side isolating valves of the cooling water supply and return line.
- Place a collecting container below the cooling water supply [13], [14] and [15] (if installed)
- Open the **>Cooling water drain<** [15] (if installed). If the temperature control unit is not equipped with a **>Cooling water drain<** [15]: Open the **>Cooling water inlet<** [13]. The cooling water will begin to drain out. Allow the cooling water to fully drain.
- Open the **>Cooling water outlet<** [14]. The cooling water will begin to drain out. Allow the cooling water to fully drain.
- Remove the collecting containers below the cooling water supply [13], [14] and [15] (if installed) after draining. Properly dispose of the contents of the collecting containers. → Page 15, Section **»Proper disposal of resources and consumables«**.

7.2.4.2 Dismantling the cooling water supply

PROCEDURE

- Disconnect the **>Cooling water inlet<** [13] from the building’s cooling water supply.
- Disconnect the **>Cooling water outlet<** [14] from the building’s cooling water return line.
- Close the **>Cooling water drain<** [15] (if present).

7.2.4.3 Cleaning the hat-type strainer/dirt trap

- **Table-top models:** Remove the hat-type strainer from the **>Cooling water inlet<** [13].
- **Free-standing models:** Remove the paneling around the cooling water supply [13], [14] and [15] (if installed). Located immediately behind the **>Cooling water inlet<** [13] is the dirt trap.
  - Carefully detach the cover (hexagonal).
  - Remove the metal strainer located below.
- Clean the hat-type strainer/metal strainer under running water.
- Re-insert the hat-type strainer/metal strainer after cleaning work.
- **Free-standing models:** Carefully fasten the cover (hexagonal) and mount the paneling around the cooling water supply [13], [14] and [15] (if installed).

7.2.4.4 Installing the cooling water supply

- Connect the **>Cooling water inlet<** [13] to the building’s cooling water supply.
- Connect the **>Cooling water outlet<** [14] to the building’s cooling water return line.
- Check the connections for leaks.
- Open the building-side isolating valves of the cooling water supply and return line.

7.3 Thermal fluid inspection, replacement and circuit cleaning

Observe the wiring diagram. → From page 65, section **»Annex«**.

CAUTION

Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS

- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

NOTE

During an active circulation, the thermal fluid circuit is shut off by shut-off valves

MATERIAL DAMAGE TO THE CIRCULATING PUMPS INSTALLED IN THE TEMPERATURE CONTROL UNIT

- Do not close the thermal fluid circuit during an active circulation by means of shut-off valves.
- Warm the thermal fluid to room temperature before stopping the circulation.

7.3.1 Thermal fluid replacement

NOTE

Mixing different thermofluids in a thermal fluid circuit

PROPERTY DAMAGE

- Do **not** mix different types of thermofluid (such as mineral oil, silicone oil, synthetic oil, water, etc.) in a thermofluid circuit.
- The thermal fluid circuit **must** be rinsed when changing from one type of thermal fluid to another. No residues of the previous type of thermal fluid may remain in the thermal fluid circuit.

7.3.1.1 Externally closed application

Observe the following when replacing the thermal fluid: → Page 42, section **»Filling and venting externally closed application«**. The draining and filling operations are described in this section.

7.3.2 Rinsing the thermal fluid circuit

DANGER

Setpoint and overtemperature protection are not adjusted to the thermofluid

MORTAL DANGER FROM FIRE

- The cut-out value of the overtemperature protection **must** be adapted to the thermofluid. Set the cut-out value of the overtemperature protection 25 K below the fire point of the thermofluid.
- The setpoint set during rinsing **must** be adjusted to the thermofluid used.

CAUTION

Non-compliance with the safety data sheet for the thermal fluid to be used

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected.
- Observe the local regulations/work instructions.
- Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping because floor and work area are contaminated. Clean the workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.

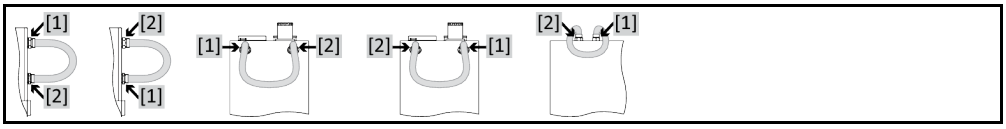
NOTE

Mixing different thermofluids in a thermal fluid circuit

PROPERTY DAMAGE

- Do **not** mix different types of thermofluid (such as mineral oil, silicone oil, synthetic oil, water, etc.) in a thermofluid circuit.
- The thermal fluid circuit **must** be rinsed when changing from one type of thermal fluid to another. No residues of the previous type of thermal fluid may remain in the thermal fluid circuit.

Example: Connecting a short circuit hose



The inner components of the temperature control unit must be dried out Need to avoid boiling retardation during future uses (e.g. use of a silicone oil at temperatures above about 100 °C).

INFORMATION

Not all temperature control units are equipped with the same combination of connections/drains. Skip the step in the procedure if the connection / drain is not available on your temperature control unit.

PROCEDURE

- Drain the temperature control unit. → Page 44, section **»Draining externally closed applications«**.

INFORMATION

Residual thermal fluid can remain in the pump chamber and the internal lines after draining. Leave the temperature control unit with open valves for a while.

- Check the fill level in the collecting container at the other end of the drain hose. Follow the instructions for the proper disposal of thermal fluid. → Page 15, Section **»Proper disposal of resources and consumables«**.
- **Temperature control unit with >Sight glass<** [23]**:** Mount the knurled screw on the **>Drain<** [8] and on the **>Residues drain<** [10] (if installed).

INFORMATION

Perform the following steps without attaching a short circuit hose, if the application used by you (externally closed) is also dirty. In this case, leave your externally closed application connected to the temperature control unit. This rinses the temperature control unit and your application at the same time.

- Connect the **>Circulation flow<** [1] with the **>Circulation return<** [2] at the temperature control unit using a bypass hose.
- **Fill** the system (minimum fill level) with the thermal fluid you wish to use. → Page 42, Section **»Filling and venting externally closed application«**.
- **Vent** the system. Described → Page 42, Section **»Filling and venting externally closed application«**.
- Adjust the **setpoint** and the cut-out value of the **overtemperature protection** to the thermal fluid used. → Page 39, Section **»Setting the setpoint«** and → Page 40, Section **»Setting the overtemperature (OT) protection«**.
- **Start** the **circulation**. The length of rinsing depends on the level of soiling.
- **Stop** the **circulation**.
- **Drain** the temperature control unit. → Page 44, Section **»Draining externally closed applications«**.
- Connect the **>Circulation flow<** [1] with the **>Circulation return<** [2] at the temperature control unit using a bypass hose.
- Repeat the steps “Filling”, “Venting”, “Start/Stop temperature control process” and “Draining” until the drained thermal fluid remains clear.
- Remove the bypass hose after completely draining the temperature control unit.

INFORMATION

Leave an application connected, if you have simultaneously rinsed a used application (externally closed).

- Leave the drains open for a while to allow the thermal fluid remaining in the temperature control unit to evaporate.
- Close all valves → Page 44, Section **»Closing the valves«**.
- Re-connect your application. → Page 44, Section **»Dismantling/mounting the application«**.
- Fill the temperature control unit with thermal fluid. → Page 42, Section **»Filling and venting externally closed application«**.
- Vent the temperature control unit. → Page 42, Section **»Filling and venting externally closed application«**.
- Restart the temperature control unit in normal mode.

7.4 Cleaning the surfaces

CAUTION

Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS

- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

NOTE

Exposed plug contacts

DAMAGE CAUSED BY FLUID INGRESS

- Protect unused plug contacts with the protective caps supplied.
- Clean surfaces only with a damp cloth.

A standard stainless steel cleaning agent is suitable for cleaning the stainless steel surfaces. Carefully clean painted surfaces (damp only) using a solution of sensitive-fabrics detergent. Observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.

7.5 Inspect the mechanical seal

NOTE

No visual inspection of the mechanical seal

MATERIAL DAMAGE IN THE TEMPERATURE CONTROL UNIT CAUSED BY LEAKING MECHANICAL SEAL

- Check the mechanical seal once a month.
- If case of leakage, stop the temperature control unit and contact Customer Support. → Page 63, section **»Contact data«**.

Expect the formation of drops at the mechanical seal when operating with thermal fluids that evaporate only very slowly, as mechanical seals are never absolutely tight. These drops must be removed if necessary. → Page 52, section **»Function check and visual inspection«**. The tightness of the mechanical seal must be visually checked. In case of a leakage, more thermal fluid escapes at the bottom of the temperature control unit. Observe the proper disposal of thermal fluid. → Page 15, section **»Proper disposal of resources and consumables«**.

7.6 Plug contacts

NOTE

Exposed plug contacts

DAMAGE CAUSED BY FLUID INGRESS

- Protect unused plug contacts with the protective caps supplied.
- Clean surfaces only with a damp cloth.

Protective caps are supplied for all plug contacts. Make sure that any plug contacts not required are protective with the caps.

7.7 Decontamination/repairs

CAUTION

Returning a not decontaminated temperature control unit for repair

PHYSICAL INJURY AND PROPERTY DAMAGE CAUSED BY HAZARDOUS MATERIALS IN OR ON THE TEMPERATURE CONTROL UNIT

- Carry out appropriate decontamination.
- The decontamination process depends on the type and quantity of the materials used.
- Consult the relevant safety data sheet.
- You will find a prepared return receipt at www.huber-online.com.

As the responsible body you are responsible for carrying out decontamination **before** third-party personnel come into contact with the temperature control unit / accessory. Decontamination must be carried out **before** the temperature control unit / accessory is returned for repair or inspection. Attach a clearly visible written notice stating that the temperature control unit / accessory has been decontaminated.

To simplify the process, we have prepared a form for you. This is available for download at www.huber-online.com.

8 Shutting down

8.1 Safety instructions and basic principles

DANGER

Connection/adjustment to the power supply not carried out by an electrician and/or connection to a power socket without protective earth (PE)

MORTAL DANGER FROM ELECTRIC SHOCK

- Have the connection/adjustment to the power supply carried out by an electrician.
- Always connect the temperature control unit to safety sockets (PE).

DANGER

Damaged power cable/power cable connection

MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power supply cable/power supply connection replaced and inspected by an electrician.
- Do not use a power cable that is longer than **3 m**.

WARNING

Risk of tipping due to unstable temperature control unit

SERIOUS INJURY AND PROPERTY DAMAGE

- Avoid risk of tipping due to unstable temperature control unit.

CAUTION

Non-compliance with the safety data sheet for the thermal fluid to be used

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected.
- Observe the local regulations/work instructions.
- Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping because floor and work area are contaminated. Clean the workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.

CAUTION

Hot or very cold thermal fluid

SEVERE BURNS/FROSTBITE OF LIMBS

- Before draining, ensure that the thermal fluid has room temperature (20 °C).
- If, at this temperature, the thermal fluid is too viscous to be drained: Control the temperature of the thermal fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the thermal fluid when the drain is open.
- Danger of burns when draining thermal fluids at temperatures above 20 °C.
- Wear your Personal Protective Equipment for draining.
- Only drain using suitable drainage hose and collecting container. These must be compatible with the thermal fluid and its temperature.

INFORMATION

All safety instructions are important and must be followed accordingly during working operations!

8.2 Switch-off

PROCEDURE

- Turn off the temperature control unit.
- Disconnect the temperature control unit from the power supply connection.

8.3 Draining the temperature control unit

PROCEDURE

➢ Drain the temperature control unit. → From page 42, section **»Filling, venting and draining«**.

8.4 Draining the cooling water

INFORMATION This section must be observed when using water-cooled temperature control units.

8.4.1 Draining process

⚠ CAUTION

Pressurized cooling water connections

RISK OF INJURY

➢ Wear your personnel protective equipment (e.g. safety goggles).
➢ Carefully open the cooling water connection. Open slowly (1-2 signal edges) and drain the cooling water slowly.

NOTE

Building-side isolating valves are not closed

DAMAGE BY FLOODING OF ROOMS

➢ Close the building-side isolating valves of the cooling water supply and return line.
➢ Place a collecting container below the cooling water supply [13], [14] and [15] (if installed).

PROCEDURE

➢ Proceed as described to drain the cooling water circuit.
→ From page 55, section **»Draining the cooling circuit«**.
→ From page 55, section **»Dismantling the cooling water supply«**.

8.5 Deinstalling the collecting container

PROCEDURE

➢ Remove the hose from the collecting container.
➢ Follow the instructions for the proper disposal of thermal fluid. → Page 15, section **»Proper disposal of resources and consumables«**.
➢ Dismantle the hose at the **>Overflow<** [12].

8.6 Uninstalling an external application

PROCEDURE

➢ Disconnect the external application from the temperature control unit.

8.7 Mounting the knurled screws

PROCEDURE

➢ Check whether the knurled screws on the drains have been mounted and hand-tightened.

8.8 Screw in/deactivate the leveling feet (if installed)

Ensure that the leveling feet are screwed in/deactivated before you pack the temperature control unit.

PROCEDURE

- ➢ Ensure that the locking brakes of the casters (if installed) are activated.
- ➢ Screw in the leveling feet.
- ➢ **Free-standing models:** Ensure that the locking brakes of the casters (if installed) are deactivated.

8.9 Packing

Always use the original packaging! → Page 23, section **»Unpacking«**.

8.10 Shipping

NOTE

Temperature control unit transported in a horizontal position

DAMAGE TO THE COMPRESSOR

- ➢ Only transport the temperature control unit in an upright position.

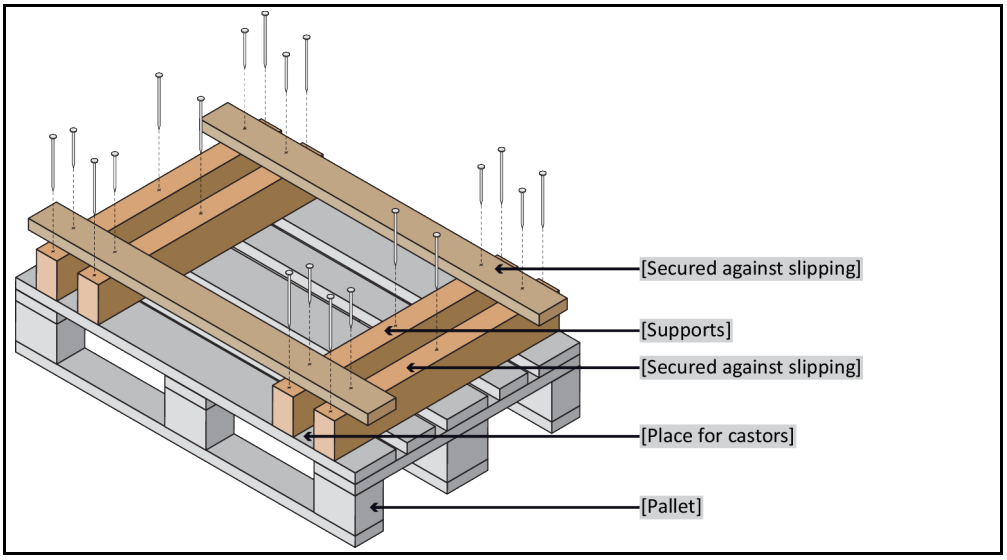
NOTE

Temperature control unit transported incorrectly

PROPERTY DAMAGE

- ➢ Do not transport by truck on the castors or feet.
- ➢ Comply all requirements in this section to avoid damage to the temperature control unit.

Pallet with squared timber for free-standing units



Transport using the lugs, if fitted, on the top of the temperature control unit. Do not transport the temperature control unit alone and without aids.

- Always use the original packaging for transportation.
- Indicate the upright transport position with arrows on the packaging.
- Always transport the temperature control unit upright on a pallet!
- Protect attachments from damage during transportation!
- During transport, place the temperature control unit on squared timber to protect the casters/feet.
- Secure with tensioning belts/lashing straps that are suitable for the weight.
- Additionally secure (depending on model) with plastic film, cardboard and straps.

8.11 Disposal

The operating company must observe the national and local regulations for the proper disposal.

CAUTION

Uncontrolled or incorrect opening of the coolant circuit

RISK OF INJURY AND ENVIRONMENTAL DAMAGE

- Work on the coolant circuit and disposal of the refrigerant must be carried out by approved refrigeration/air-conditioning system contractors.
- Please strictly observe: → Page 18, section **»Temperature control units with fluorinated greenhouse gases/refrigerants«**.

NOTE

Improper disposal

ENVIRONMENTAL DAMAGE

- Spilled/leaked thermal fluid must be discarded immediately and correctly. → Page 15, section **»Proper disposal of resources and consumables«**.
- To avoid environmental damage, have "disused" temperature control units disposed of exclusively by approved waste management companies (e.g. refrigeration and air conditioning companies).
- Please strictly observe: → Page 18, section **»Temperature control units with fluorinated greenhouse gases/refrigerants«**.

Huber temperature control units and Huber accessories are made of high quality, recyclable materials. For example: Stainless steel 1.4301 / 1.4401 (V2A), copper, nickel, FKM, Perbunan, NBR, ceramic, carbon, Al-Oxid, red brass, brass, nickel-plated brass and silver solder. Proper recycling of the temperature control unit and accessories can actively help reduce CO_2 emissions in the production of these materials. Follow the laws and regulations of your jurisdiction when disposing material.

8.12 Contact data

INFORMATION

Contact your supplier or local specialist retailer **prior** to returning the temperature control unit. The contact data can be found on our homepage www.huber-online.com under the heading „Contact". Please keep the serial number of the temperature control unit ready. The serial number can be found on the nameplate of the temperature control unit.

8.12.1 Telephone number: Customer Support

If your country is not mentioned in the list below: The responsible service partner can be found on our homepage www.huber-online.com under the heading „Contact".

- Huber Deutschland: +49 781 9603 244
- Huber China: +86 (20) 89001381
- Huber India: +91 80 2364 7966
- Huber Ireland: +44 1773 82 3369
- Huber Italia: +39 0331 181493
- Huber Swiss: +41 (0) 41 854 10 10
- Huber UK: +44 1773 82 3369
- Huber USA: +1 800 726 4877 | +1 919 674 4266

8.12.2 Telephone number: Sales

Telephone: +49-781-9603-123

8.12.3 Email address: Customer Support

Email: support@huber-online.com

8.13 Clearance certificate

This certificate must be enclosed with the temperature control unit. → Page 58, section **»Decontamination/repairs«**.

9 Annex

Inspired by **temperature** designed for you

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